Annual Monitoring Report

January 2011 – December 2011

March 1, 2012

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

A	Assessment
AG	Agriculture
AI	Active Ingredient
AMR	Annual Monitoring Report
AWEP	Agricultural Water Enhancement Program
BMP	Best Management Practice
BU	Beneficial Use
C	Core
CalPIP	California Pesticide Information Portal
CDEC	California Data Exchange Center
CDFA	California Department of Food and Agriculture
CEDEN	California Environmental Data Exchange Network
COC	Chain of Custody
CRM	Certified Reference Materials
CURES	Coalition for Urban and Rural Environmental Stewardship
CVRWQCB	Central Valley Regional Water Quality Control Board
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DO	Dissolved Oxygen
DPR	(California) Department of Pesticide Regulation
DQO	Data Quality Objective
DWR	(California) Department of Water Resources
EC_{50}	Effective Concentration of 50% of the measured endpoint
EPA	(United States) Environmental Protection Agency
ESJWQC	East San Joaquin Water Quality Coalition
FD	Field Duplicate
FREP	Fertilizer Research and Education Program
HCH	Hexachlorocyclohexane
ILRP	Irrigated Lands Regulatory Program
K_{oc}	Organic Carbon Partitioning Coefficient
LABQA	Laboratory Quality Assurance
LC_{50}	Lethal Concentration at 50% mortality
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
MCL	Maximum Contaminant Level
MDL	Minimum Detection Limit
MLJ-LLC	Michael L. Johnson, LLC
MPM	Management Plan Monitoring

MPN	Most Probable Number
MPUR	Management Plan Update Report
MRP	Monitoring and Reporting Program Order No. R5-2008-0005
MRPP	Monitoring and Reporting Program Plan
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MUN	Municipal and Domestic Supply
NA	Not Applicable
ND	Not Detected
NM	Normal Monitoring
NRCS	Natural Resources Conservation Service
OP	Organophosphate Pesticides
PAM	Polyacrylamide
PCA	Pest Control Advisor
pH	Power of Hydrogen
PR	Percent Recovery
PTFE	Polytetraflouroethylene (Teflon™)
PUR	Pesticide Use Report
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
REC 1	Water Contact Recreation
RfD	Reference Dose
RL	Reporting Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SC	Specific Conductance
SD	Standard Deviation
SG	Statistically significantly different from control; Greater than 80% threshold
SL	Statistically significantly different from control; Less than 80% threshold
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
TDS	Total Dissolved Solids
TID	Turlock Irrigation District
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
VOA	Volatile Organic Analyte

WPHA	Western Plant Health Association
WQTL	Water Quality Trigger Limit
YSI	Yellow Springs Instruments

LIST OF UNITS

°C	degrees Celsius
cfs	cubic feet per second
cm	centimeter
dw	dry weight
g	gram
kg	kilogram
L	liter
lbs	pounds
mg	milligram
mL	milliliter
mm	millimeter
ng	nanograms
NTU	Nephelometric Turbidity Units
sec	second
µg	microgram
µm	micrometer
µmhos	micromhos
µS	microsiemens

LIST OF TERMS

Agricultural Commissioner – County Agriculture Commissioner
ArcGIS – Geographic Information Systems mapping software
Central Valley or Valley – California Central Valley
Coalition –East San Joaquin Water Quality Coalition
Coalition/ESJWQC region – The region within the Central Valley that is monitored by the East San Joaquin Water Quality Coalition
Drainage –Water that moves horizontally across the surface or vertically into the subsurface from land
Landowners – One or more persons responsible for the management of the irrigated land
Non project QA sample – Sample results from another project other than the Coalition included to meet laboratory Quality Assurance requirements.
Normal Monitoring –Refers to monitoring in the most recent MRPP
Regional Board – Central Valley Regional Water Quality Control Board
Site subwatershed – Starting from the sampling site, all waterbodies that drain, directly or indirectly, into the waterbody before the point where sampling occurs.
Special study – A study conducted outside of Normal Monitoring activities that involves monitoring specific constituents in an effort to determine the mechanism responsible for the exceedances; also includes Total Maximum Daily Load (TMDL) monitoring.
Subwatershed – The topographic perimeter of the catchment area of a stream tributary (Environmental Protection Agency (EPA) terms of environment: http://www.epa.gov/OCEPAterms/sterms.html).
Waiver – Central Valley Regional Water Quality Control Board Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands, Order No. R5-2008-0005 amending Order No. R5-2006-0053.
Waterbody –Standing or flowing water of any size that may or may not move into a larger body of water, including lakes, reservoirs, ponds, rivers, streams, tributaries, creeks, sloughs, canals, laterals and drainage ditches.
Watershed – The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point (EPA terms of environment: http://www.epa.gov/OCEPAterms/wterms.html).

ANNUAL MONITORING REPORT (AMR) REQUIREMENTS – SECTION KEY

REQUIRED SECTION – MONITORING AND REPORTING PROGRAM (MRP)	SECTION NAME/LOCATION - AMR
1. Signed Transmittal Letter;	Cover Letter
2. Title page;	East San Joaquin Water Quality Coalition AMR
3. Table of contents;	Table of Contents, List of Tables, List of Figures, List Appendices
4. Executive Summary;	Executive Summary[1]
5. Description of the Coalition Group geographical area;	Geographical Area
6. Monitoring objectives and design;	Monitoring Objectives and Design[1]
7. Sampling site descriptions and rainfall records for the time period covered under the AMR;	Sampling Site Descriptions and Rainfall Records[1]
8. Location map(s) of sampling sites, crops and land uses;	Sampling Site Descriptions and Rainfall Records[1], Appendix VIII (Land Use Maps and 2011 Annual Site Photos)
9. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible (example table is included in (MRP Order Attachment C);	Appendix II (Monitoring Results)[1]
10. Discussion of data to clearly illustrate compliance with the Coalition Group Conditional Waiver, water quality standards, and trigger limits;	Monitoring Results and Sample Details[1], Discussion of Results[1], Conclusions and Recommendations[1]
11. Electronic data submitted in a SWAMP comparable format;	SWAMP Comparability Access Database and Electronic Data Deliverables (attached CDs)
12. Sampling and analytical methods used;	Sampling and Analytical Methods[1]
13. Copy of chain-of-custody forms;	Appendix I (Chain of Custody Forms)
14. Field data sheets, signed laboratory reports, laboratory raw data (as identified in Attachment C);	Appendix IX (Field Sheets), Quarterly Data Submittal (attached CD, attached printed hard copies), Appendix VI (Toxicity Identification Evaluation Report)
15. Associated laboratory and field Quality Control samples results;	Appendix III (Lab and Field QC Results)
16. Summary of Quality Assurance Evaluation results (as identified in Attachment C for Precision, Accuracy and Completeness) ;	Precision, Accuracy and Completeness
17. Specify the method used to obtain flow at each monitoring site during each monitoring event;	Sampling and Analytical Methods[1]

Required Section – Monitoring and Reporting Program (MRP)	Section Name/Location - AMR
18. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site identification and date.	Appendix VIII (Land Use Maps and 2011 Annual Site Photos)
19. Summary of Exceedance Reports submitted during the reporting period and related pesticide use information;	Discussion of Results[1], Appendix IV (Pesticide Use Reports), Appendix V (Exceedance Reports) Pesticide Use Report (PUR) Access Database (attached CD)
20. Actions taken to address water quality exceedances that have occurred, including but not limited to, revised or additional management practices implemented;	Actions Taken To Address Water Quality Exceedances, Appendix VII (Meetings, Agendas and Handouts)
21. Status update on preparation and implementation of all management plans and other special projects; and	Management Plan Status and Special Projects
22. Conclusions and recommendations.	Conclusions and Recommendations[1]

[1]All data for Lateral 3 @ East Taylor Rd (2011 Assessment Monitoring) located in Appendix X.
QC- Quality Control
SWAMP- Surface Water Ambient Monitoring Program

Table A. ESJWQC 2012 AMR amendments summary.

Item #	Amendments Descriptions	Date Submitted	2012 AMR Items Revised
1	Revisions were made to exclude previously reported detections (demeton-s, dimethoate, phosmet, atrazine and cyanazine) and an exceedance (azinphos methyl) at Berenda Slough @ Ave 18 ½ due to a laboratory reporting error. All of these results are below the minimum detection level.	April 30, 2012	Table A, page 2 Table 35, page 112 Table 45, page 136 Appendix II Appendix IV

MONITORING AND REPORTING PROGRAM PLAN (MRPP) AND QUALITY ASSURANCE PROJECT PLAN (QAPP) AMENDMENTS

Table 1. ESJWQC MRPP and QAPP amendments summary.

Original ESJWQC MRP and QAPP Plans submitted August 25, 2008 and approved September 15, 2008.

ITEM #	AMENDMENTS DESCRIPTIONS	DATE SUBMITTED	MRP PLAN PAGE NUMBER	DATE APPROVED
1	Request to exchange sites: Exchanged Mootz Drain @ Langworth Rd for Mootz Drain downstream of Langworth Pond.	September 4, 2009	Table 4, page 30 Figure 11, page 32 Table 5, page 37 Figure 12, page 40 Verbiage,page44-45 Table 7, page 47 Table 10, page 52 Table 11, page 55 Table 13, page 61 Attachment II	November 18, 2009
2	Request to submit quarterly monitoring results in electronic format[1]	May 6, 2010	Table 16, page 73 Verbiage, page 72	May 17, 2010
3	Request to stop monitoring at South Slough @ Quinley Rd.	June 5, 2009	Table 4, page 30 Figure 11, page 32 Table 5, page 37 Figure 12, page 40 Verbiage, page44-45 Table 7, page 47 Table 10, page 52 Table 11, page 55 Table 13, page 61 Attachment II	June 3, 2010
4	Updated MRPP to consolidate all approved amendments since 9/15/2008 MRPP approval. Updates included type corrections as well.	October 20, 2010	Verbiage, page 8 Table 10, page 52 Table 12, page 58 Table 13, page 61 Table 14, page 66 Verbiage, page 59	February 23, 2011
5	Modification to Monitoring Strategy- Request to stop monitoring for certain Assessment constituents except during high Total Suspended Solids (TSS) events	Originally sent: May 14, 2009 Resent: November 11, 2010	Table 13, pg 63 Table 13B	May 6, 2011

ITEM #	AMENDMENTS DESCRIPTIONS	DATE SUBMITTED	MRP PLAN PAGE NUMBER	DATE APPROVED
6	Modification to Monitoring Schedule-Request to remove Yori Grove Drain @ East Taylor Rd from the monitoring plan and replace site with Levee Drain @ Carpenter Rd.	December 28, 2011	Table 4, pg 31 Table 5, pg 37 Verbiage, pg 46 Table 7, pg 49 Table 10, pg 52	February 7, 2012
7	Updated associated tables to reflect the suspension of Core and Management Plan Monitoring and the reduction of Assessment Monitoring constituents.	April 30, 2012	Table 8, pg 50 Table 9, pg 51 Table 10, pgs 52-53 Table 12, pgs 60-62	April 17, 2012
MODIFICATIONS TO Original ESJWQC QAPP Plan				
1	QAPP updated to consolidate all approved amendments since 9/15/2008 QAPP approval. Updates include typo corrections.	October 20, 2010	Verbiage, page 2 Verbiage, page 8 Figure 1, page 11 Verbiage, page 26 Table 5, page 22 Table 8, page 26 Table 15, page 44 Table 16, page 45 Verbiage, page 49 Table 17, page 51 Table 18, page 53 Table 19, page 55 Verbiage, page 56 Figure 4, page 59 Appendices: XI-XXXII and, XXXV-XXXVII	February 23, 2011
2	QAPP updated method validation package for analysis of pyrethroids in sediment using GC/MS-NCI SIM.	December 6, 2010	Table 2, page 16 Table 13, page 40 Table 15, page 44 Table 16, page 45	February 18, 2011

[1] All deliverables are submitted electronically (quarterly monitoring data reports, Annual Monitoring Report, Annual Management Plan Update Report).

EXECUTIVE SUMMARY

The East San Joaquin Water Quality Coalition (ESJWQC) area includes the portions of Stanislaus and Merced Counties east of the San Joaquin River, Madera, Tuolumne, and Mariposa Counties and the portion of Calaveras County that drains into the Stanislaus River. In addition to the San Joaquin River, which forms the south and west boundary of the Coalition region, there are five major rivers in the watershed: the Fresno River, the Chowchilla River, the Merced River, the Tuolumne River and the Stanislaus River. In addition, the Eastside Bypass is considered a major waterbody. These eastern tributaries of the San Joaquin River drain the Sierra Nevada range from east to west. The largest land cover type in the Coalition region is native vegetation. Irrigated agriculture is a minor component of the entire region at slightly less than 20%, and the growing urban areas within the Central Valley are also included in a portion of some of the Coalition's zones. Other irrigated land uses involve dairies and a small quantity of feedlots.

The Coalition area is divided into six zones based on hydrology, crop types, land use, soil types, and rainfall. Zone names are based on the Core Monitoring location within that zone: 1) Dry Creek @ Wellsford Zone, 2) Prairie Flower Drain @ Crows Landing Zone, 3) Highline Canal @ Hwy 99 Zone, 4) Merced River @ Santa Fe Zone, 5) Duck Slough @ Gurr Rd Zone, and 6) Cottonwood Creek @ Rd 20 Zone. Descriptions of zone-specific climate, soil characteristics, land use, as well as water drainage and flow are included in the Coalition's Monitoring and Reporting Plan (submitted August 25, 2008 and approved September 15, 2008).

The ESJWQC zones include a Core site and rotating Assessment Monitoring locations. Core sites are meant to track trends in water quality over a longer period of time and will be monitored continuously over several years. There are fewer constituents monitored at Core Monitoring locations (primarily physical parameters and nutrients). Assessment Monitoring locations are meant to characterize discharge in the zone in which they are located. Assessment Monitoring includes the full suite of constituents. Assessment sites are rotated every third year to a new site. Core sites receive Assessment Monitoring every third year, as outlined in the Monitoring and Reporting Program Plan (MRPP) Table 10, pages 52-53.

Monitoring Program Objectives

The Coalition's water quality monitoring program is outlined in the ESJWQC MRPP (approved September 15, 2008, amended and approved February 23, 2011). Changes in the monitoring program since the amended MRPP involve removal of one monitoring site and the addition of a new monitoring site. On December 28, 2011 a request was sent to remove the Yori Grove Drain @ East Taylor Rd sample site from the Coalition's monitoring program due to limited access and limited irrigation drainage to the site. The Coalition requested to amend its MRPP monitoring schedule to monitor Levee Drain @ Carpenter Rd as the Zone 2 Assessment Monitoring location for 2012 through 2014 (approved on February 7, 2012). The Coalition collected Assessment Monitoring samples from Lateral 3 along East Taylor Rd instead of Yori Grove Drain @ East Taylor Rd from January through December 2011. All Lateral 3 along

East Taylor Rd monitoring results have been analyzed separately and are located in Appendix X of this report. Assessment of completeness, precision and accuracy results are included in Appendix III and a discussion of all Quality Assurance/Quality Control (QA/QC) can be found in the Precision, Accuracy and Completeness section of this report.

The primary objectives of the monitoring program are to characterize discharge from irrigated agriculture and to determine if the implementation of management practices is effective in reducing or eliminating discharge and eliminating impairments of beneficial uses. The ESJWQC monitored 18 sites (including Lateral 3 along East Taylor Rd; all monitoring results for Lateral 3 along East Taylor Rd are located in Appendix X) from January through December 2011. Of these 18 sites, 12 were monitored under management plans as outlined in the ESJWQC MRPP and Management Plan. Of the sites monitored for management plan constituents, six sites (Berenda Slough along Ave 18 ½, Cottonwood Creek @ Rd 20, Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd) were also monitored monthly for Assessment Monitoring constituents, and six sites (Bear Creek @ Kibby Rd, Dry Creek @ Rd 18, Duck Slough @ Hwy 99, Howard Lateral @ Hwy 140, Lateral 2 ½ near Keyes Rd and Livingston Drain @ Robin Ave) were monitored during months of past exceedances for Management Plan Monitoring (MPM) only. The Coalition sampled for 45 pesticides, *E. coli*, physical parameters (total dissolved solids (TDS), total suspended solids (TSS) and turbidity), nine metals, total organic carbon (TOC), five nutrients, dissolved oxygen (DO), Power of Hydrogen (pH), specific conductivity (SC), water column toxicity to *Ceriodaphnia dubia*, *Pimephales promelas* and *Selenastrum capricornutum* and sediment toxicity to *Hyalella azteca*. Monitoring constituents are established by the Irrigated Lands Regulatory Program (ILRP) Monitoring and Reporting Program (MRP) Order No.R5-2008-0005 (Table 12, page 59).

The monitoring program in 2011 in the ESJWQC was different relative to previous years of monitoring. On May 6, 2011 the Regional Board approved the Coalition's request to modify the MRPP and its monitoring strategy to reduce water column sampling for organochlorines (including Group A pesticides), sediment bound pesticides (glyphosate, paraquat dichloride), and metals not applied by agriculture (arsenic, cadmium, lead, and molybdenum). Starting in July 2011 Assessment Monitoring for organochlorines, glyphosate, and paraquat was reduced to two monitoring events per year (one storm and one irrigation event) and monitoring for metals not applied by agriculture was reduced (two storm and two irrigation events). Constituents under a management plan continue with the originally approved management plan strategy (Tables 4, 5 and 6).

Monitoring Program Compliance

For 2011, the Coalition was able to meet its monitoring program objectives by 1) determining the concentration and load of specific contaminants in discharges to surface waters, 2) evaluating compliance with existing narrative and numeric water quality limit triggers to determine if implementation of additional management practices is necessary to improve and/or protect water quality, and 3) assessing the impact of storm water discharges from irrigated agriculture to surface water. The Coalition uses management practice survey results to determine which practices to

implement in order to reduce discharge of specific wastes that impact water quality in receiving waters of the Coalition region.

Coalition monitoring in 2011 resulted in exceedances of Water Quality Trigger Limits (WQTLs) for DO, pH, SC, *E. coli*, TDS, ammonia (ium), nitrate, copper, molybdenum, carbaryl, chlorpyrifos, dichlorodiphenyltrichloroethane (DDT), dimethoate and diuron. Water column toxicity to *C. dubia, P. promelas, S. capricornutum,* and sediment toxicity to *H. azteca* also occurred.

The physical parameter exceedances were for *E. coli* (37), SC (13), pH (12), TDS (12) and DO (11). Exceedances of the WQTL for nitrate (10) and ammonia (5) also occurred. Of the metals analyzed; there were exceedances of dissolved copper (31) and molybdenum (5). Three pesticide exceedances of the chlorpyrifos WQTL occurred; none of the three exceedances were from MPM samples. Other pesticides that exceeded the WQTL included carbaryl (1), DDT (4), dimethoate (2) and diuron (1). Overall, exceedances of physical parameters and *E. coli* were more common than exceedances of pesticides or metals.

Water column toxicity was detected in seven of 375 samples during 2011; *C. dubia* tested toxic once, *P. promelas* tested toxic twice, and *S. capricornutum* tested toxic four times. Of the seven samples exhibiting water column toxicity, four had endpoints less than 50% compared to the control. A Toxicity Identification Evaluation (TIE) was initiated on each of these four samples to determine the cause of toxicity. The TIEs initiated on samples collected on April 19, October 11, and December 6, 2011 indicated that no toxicity was detected during the TIE process and therefore the cause of the initial toxicities could not be identified. A Phase I TIE was conducted on toxic water samples collected on August 9, 2011 which indicated pyrethroid insecticides were the cause of the toxicity detected in the sample. Of the seven toxic samples, only one was collected specifically for MPM.

There were a total of two sediment samples of 24 collected (excluding Lateral 3 along East Taylor Rd) that resulted in toxicity to *H. azteca* from the storm and irrigation seasons of 2011. Both toxic sediment samples were from MPM and both were from the irrigation event. Only one sample had survival less than 80% compared to the control, and was therefore considered ecologically significant. Additional chemistry analysis was conducted for chlorpyrifos and pyrethroids on the sample (survival was 76% compared to the control), and pyrethroids were detected.

The series of actions taken to determine the potential sources of exceedances include: 1) the use of Pesticide Use Reports (PURs) to identify relevant applications that occurred upstream of the sample site and within a specified time period prior to the sampling event, and 2) an analysis of monitoring data and toxicity results to better understand the potential sources and toxicity of detected constituents.

Beginning in early 2010 focused outreach was initiated in the second priority site subwatersheds: Bear Creek @ Kibby Rd, Cottonwood Creek @ Rd 20, Duck Slough @ Gurr Rd and Highline Canal @ Hwy 99. Growers were contacted in the spring and summer of 2010 and asked to complete surveys documenting current practices and indicate which recommended practices they anticipated implementing in the

upcoming year. In early 2011 follow up contacts with growers from these second priority site subwatersheds were conducted to document implementation of new practices. Interim results from follow up with growers from the second set of priority subwatersheds were included in the Addendum to the April 1, 2011 Management Plan Update Report (MPUR) submitted on June 27, 2011. A complete analysis of the second priority results will be submitted in the MPUR on April 1, 2012.

Focused outreach began in late 2010/early 2011 in the third priority site subwatersheds: Berenda Slough along Ave 18 1/2, Dry Creek @ Rd 18, Lateral 2 ½ near Keyes Rd and Livingston Drain @ Robin Ave. Growers were contacted and asked to complete surveys documenting current practices and were required to indicate which recommended practices they anticipated implementing in the upcoming year. Results from contacts will be reported in the MPUR to be submitted on April 1, 2012.

The ESJWQC continues to be committed to collaboration with outside entities to achieve its goal of reducing the impact of agricultural discharge on water quality. Funding was made available to the Coalition in an award of two million dollars to be dispersed annually over five years ($10 million total) from the United States Department of Agriculture (USDA) Agricultural Water Enhancement Program (AWEP) to be used in Stanislaus and Merced counties (2010 Annual Monitoring Report, page 150 and Table 42, page 154). The funding is available for the installation of structural management practices on farms and dairies with operations bordering waterways within subwatersheds covered by management plans. The Coalition sent out emails and mailings to growers in high priority subwatersheds on available funding during 2011 to inform growers of available Coalition for Urban and Rural Environmental Stewardship (CURES) and AWEP funding with application instructions and deadline dates. In addition, eight million dollars in Prop 84 funding were made available for management practice installations for growers in the Duck Slough, Bear Creek, and Prairie Flower Drain subwatersheds and details were mailed to growers in 2011.

Conclusions

The results of the monitoring program for 2011 indicate that although there are substantial improvements in water quality in many areas, water quality is still not protective of beneficial uses across most of the Coalition region. The most common exceedances of WQTLs involve physical parameters such as DO, TDS, and SC which resulted in impaired Agricultural and Aquatic Life beneficial uses. *E. coli* had numerous exceedances which resulted in impaired Recreational beneficial use. Impairment to Municipal beneficial use resulted from elevated concentrations of nitrate/nitrite and ammonia. Discharges from irrigated lands are but one of many possible sources of impairments to beneficial uses.

For many parameters, it is not clear to what extent WQTL exceedances are the results of current agricultural activities. Source identification is difficult especially for non-conserved constituents. There are numerous non-conserved constituents that cannot be traced upstream, e.g. DO. Many pesticides are the result of agricultural applications and enter surface waters as a result of spray drift or runoff in either storm water or irrigation return flows. The Coalition is continuing to identify sources of WQTL exceedances through the analysis of preliminary PUR data, assessment of water quality data and

evaluation of current management practices of targeted growers. The Coalition's sourcing strategy is further described in the Coalition's Management Plan.

The Coalition's outreach program is focused on general meetings for growers across the entire Coalition region. Information on management practices is provided by the Coalition in several forums that range from meetings with one or two growers to large annual meetings sponsored by the Coalition.

The conclusions from these data are that 1) individual grower visits are a particularly effective method of communicating with members, 2) implementation of management practices is improving water quality in the Coalition region, and 3) there is opportunity for improvement in several subwatersheds in which exceedances of WQTLs still occur.

ESJWQC GEOGRAPHICAL AREA

The East San Joaquin Water Quality Coalition (ESJWQC) area includes the portions of Stanislaus and Merced Counties east of the San Joaquin River, Madera, Tuolumne, and Mariposa Counties and the portion of Calaveras County that drains into the Stanislaus River. The region that drains into the Coalition area is bordered by the crest of the Sierra Nevada on the east, the San Joaquin River on the west, the Stanislaus River on the north, and the San Joaquin River on the south. Landholdings in the vicinity of the Lone Willow Slough drainage area (west of the Eastside Bypass) are included in the Westside Water Quality Coalition.

IRRIGATED LAND

Although exact acreage is difficult to estimate due to rapidly changing land use, the Coalition area contains approximately 5,079,639 acres of which 940,884 acres (18.5%) are considered irrigated (Table 2). To obtain irrigated acreages, the Coalition uses information from two California Department of Water Resources (DWR) data sources: 1) DWR Agricultural Land and Water Use data and 2) DWR Land Use Survey.

Agricultural Land and Water Use data (DWR, http://www.water.ca.gov/landwateruse/anaglwu.cfm) estimates the acreage of irrigated crops for the entirety of each county. Land Use Survey data (DWR, http://www.water.ca.gov/landwateruse/lusrvymain.cfm) includes more detailed information regarding specific crop uses (both irrigated and non-irrigated) than the Agricultural Land and Water Use data but is updated less often. Because Land Use Survey data are available in GIS shape files, the information was mapped to the Coalition area and used for estimates of irrigated crop acreage. The data source used depends on: 1) whether or not the entire county is within the Coalition boundary, and 2) which data were developed most recently. If the entire county is not within the Coalition region, the California DWR Land Use Survey data must be utilized (even if the data are older).

For Stanislaus, Merced, and Calaveras Counties, the Coalition utilized DWR Land Use Survey data to determine irrigated land area as only portions of these counties are included in the Coalition boundary. For Tuolumne, Madera, and Mariposa Counties, data from Agricultural Land and Water Use was used since these counties are included in their entirety within the Coalition boundary (Table 2).

Table 2. Acreage of irrigated land in ESJWQC counties and available DWR data

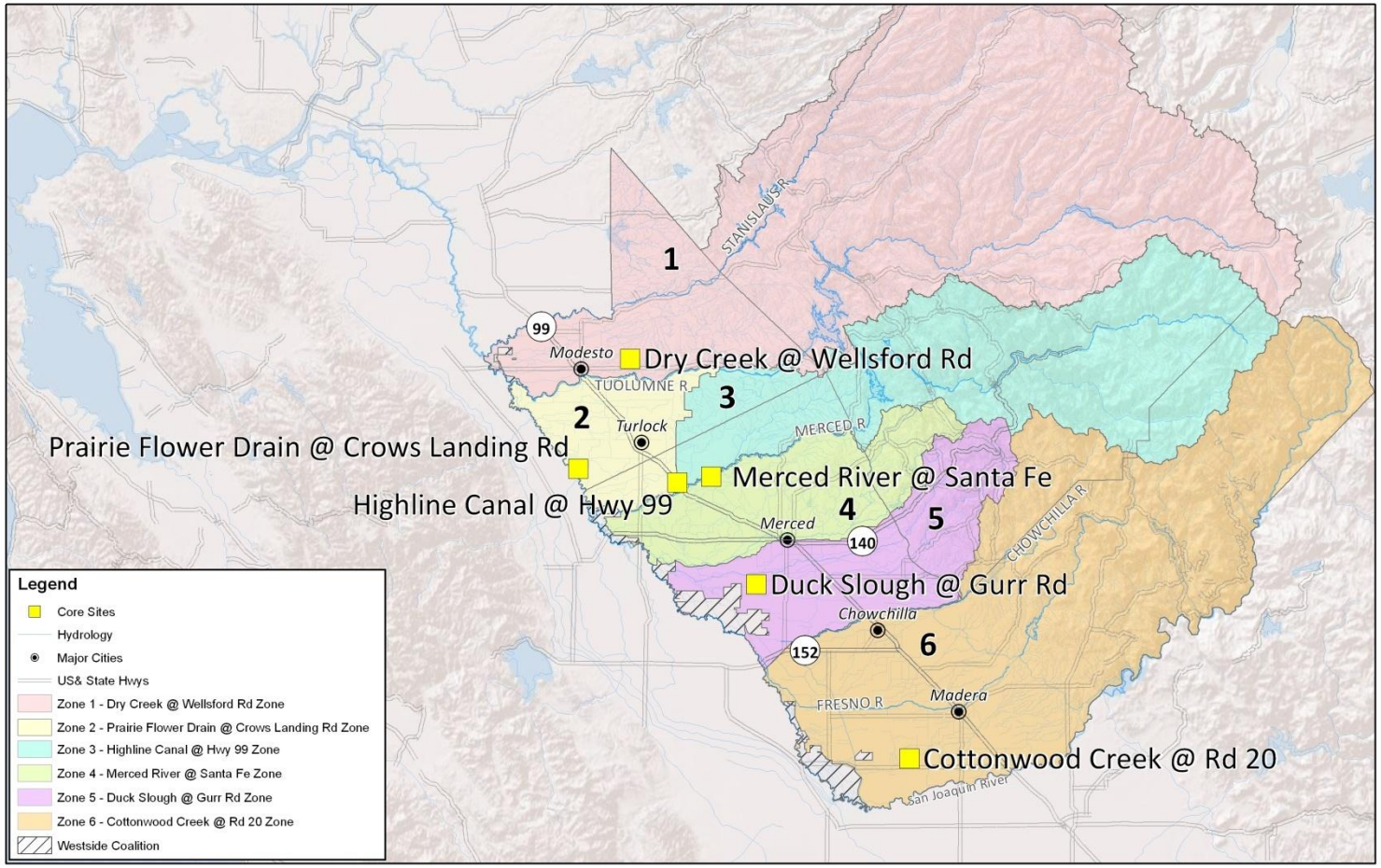
County	Irrigated Land Area (acres)	Data Source Year (Agricultural Land and Water Use)[1]	Data Source Year (Land Use Survey)[2]
Calaveras	868		2000
Madera*	327,693		2001*
Mariposa	1,300	2001	
Merced	335,125		2002
Stanislaus	274,482		2004
Tuolumne	1,416	2001	
Total	**940,884**		

[1]DWR Agricultural Land Use: http://www.water.ca.gov/landwateruse/anaglwu.cfm
[2]DWR Land Use Survey: http://www.water.ca.gov/landwateruse/lusrvymain.cfm
*Land use for Madera County is only described for 501,056 acres, 37% of the county.

GEOGRAPHICAL CHARACTERISTICS AND LAND USE

The Coalition area is divided into six zones to facilitate the creation of a comprehensive monitoring program (Figure 1). These zones are based on hydrology, crop types, land use, soil types, and rainfall. Zone acreages were determined using Land Use Survey Data (Table 3). The zones are named for the Core Monitoring location within that area: 1) Dry Creek @ Wellsford Zone, 2) Prairie Flower Drain @ Crows Landing Zone, 3) Highline Canal @ Hwy 99 Zone, 4) Merced River @ Santa Fe Zone, 5) Duck Slough @ Gurr Rd Zone, and 6) Cottonwood Creek @ Rd 20 Zone. Descriptions of zone-specific climate, water drainage and flow, soil characteristics and land use are included in the Coalition's MRPP (MRPP pages 9-27). Land use maps for each zone are included in Figures 2-7.

Figure 1. ESJWQC zone boundaries and core sites



Source of Layers:
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library.
TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library.
Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011
Basemap, Shaded Relief - ESRI
GSC North America 1983

Date Prepared: 06/28/11
ESJWQC

ESJWQC Zone Boundaries

N
0 10 20
Miles

Table 3. ESJWQC 2011 total and irrigated acreages for zones 1-6.

	ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6
	Dry Creek @ Wellsford Zone	Prairie Flower Drain @ Crows Landing Zone	Highline Canal @ Hwy 99 Zone	Merced River @ Santa Fe Zone	Duck Slough @ Gurr Rd Zone	Cottonwood Creek @ Rd 20 Zone
Total Acres[1]	1,944,177	196,486	857,615	333,858	365,754	1,381,768
Irrigated Acres[2]	130,248	144,280	83,247	115,314	136,886	329,328

[1]Total acres for ESJWQC Zones have been calculated using DWR Land Use Survey data which are reported for an entire county (Madera is described for only 37% of the county). GIS ArcInfo measurement processing on data was used to estimate the acreage for the portion of the county that is within each zone. Therefore there are minor differences in the amount of total acres reported in Table 3 versus the amount reported elsewhere.

[2]Irrigated acreage for each zone does not equal the sum of irrigated acres for all ESJWQC counties due to differences in acreage sources obtained between the county DWR Land Use layers and the Agricultural Land and Water Use estimates for 2001 .

Figure 2. Land use for Dry Creek @ Wellsford Rd Zone (Zone 1).

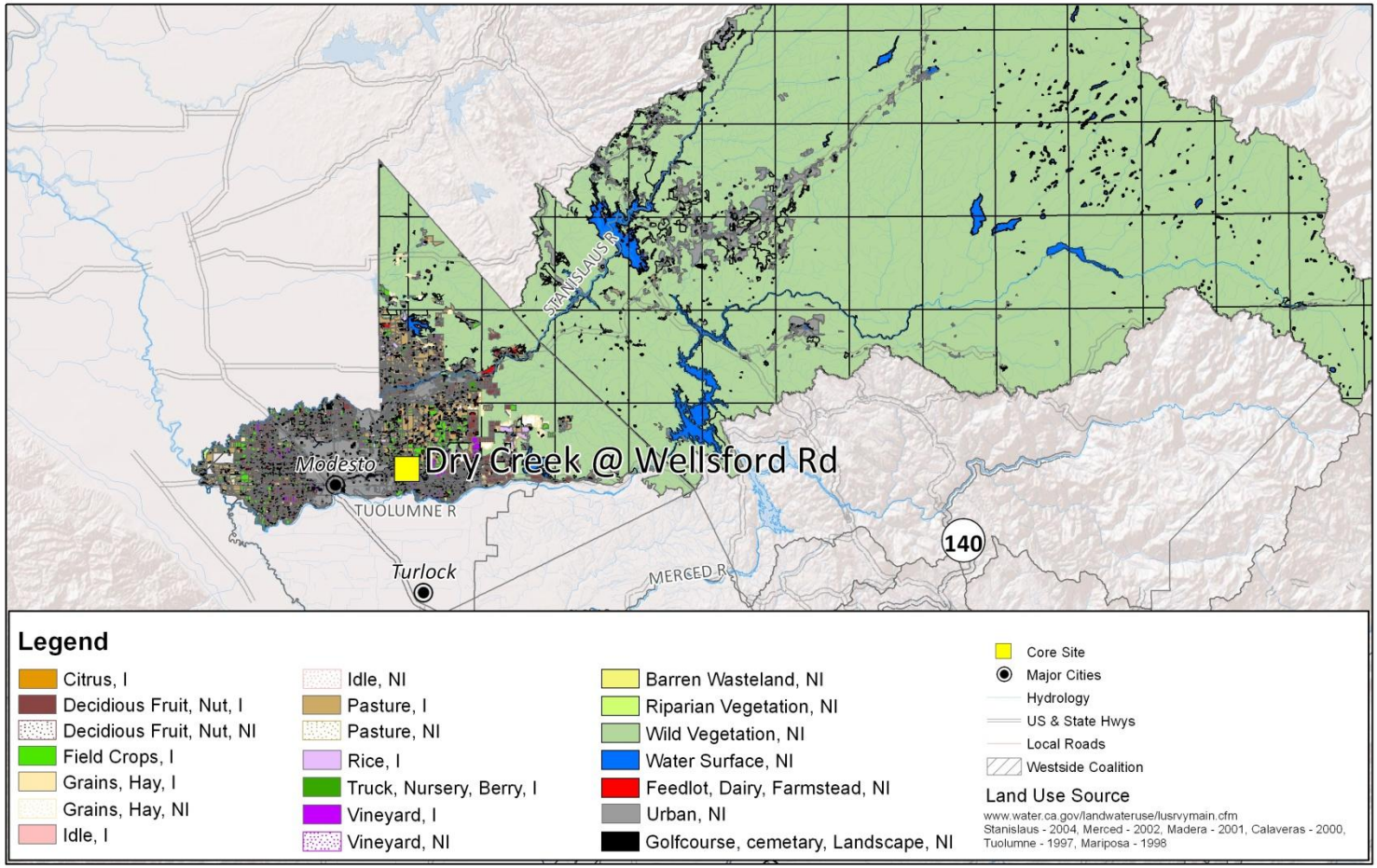


Figure 3. Land use for Prairie Flower Drain @ Crows Landing Zone (Zone 2).

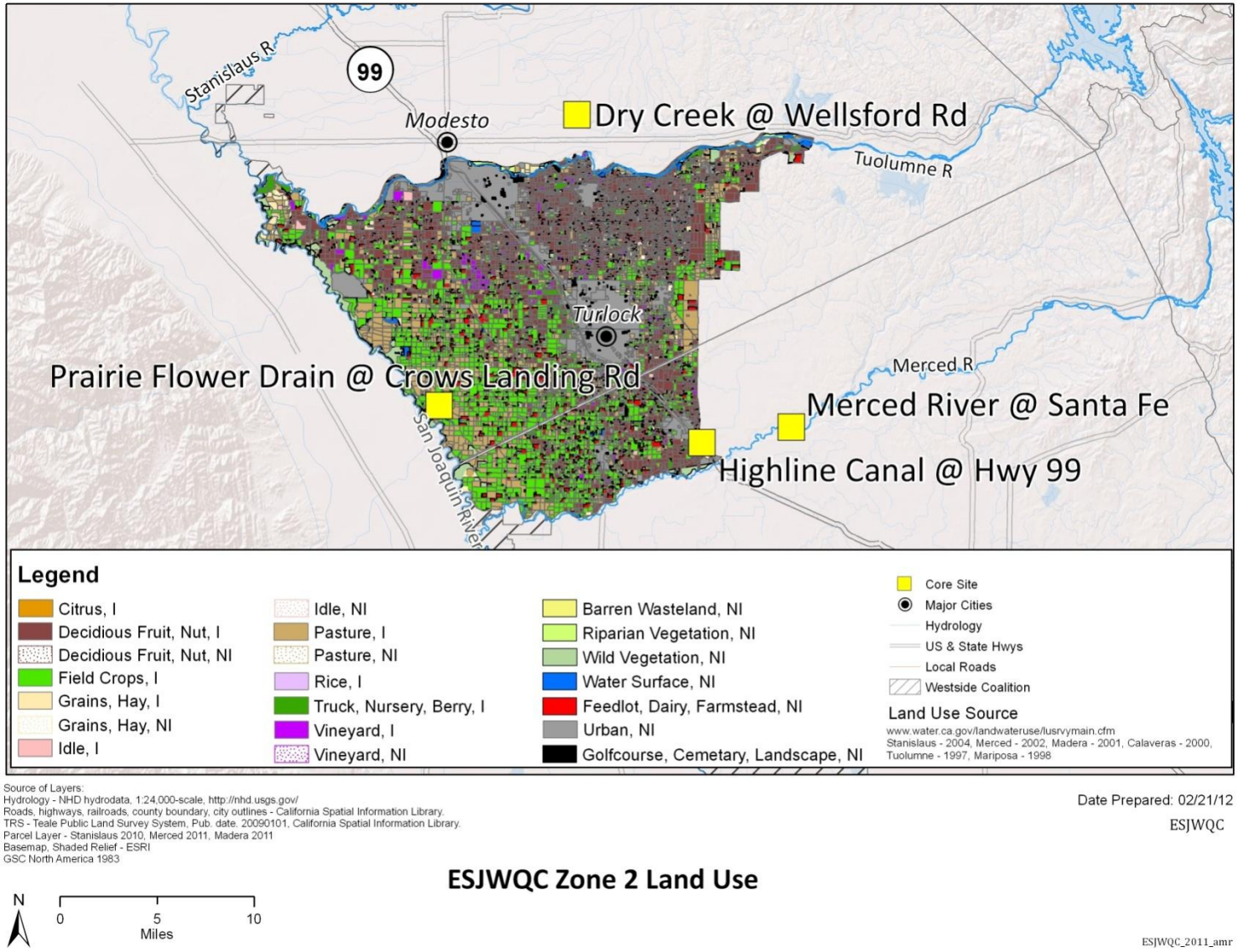


Figure 4. Land use for Highline Canal @ Hwy 99 Zone (Zone 3).

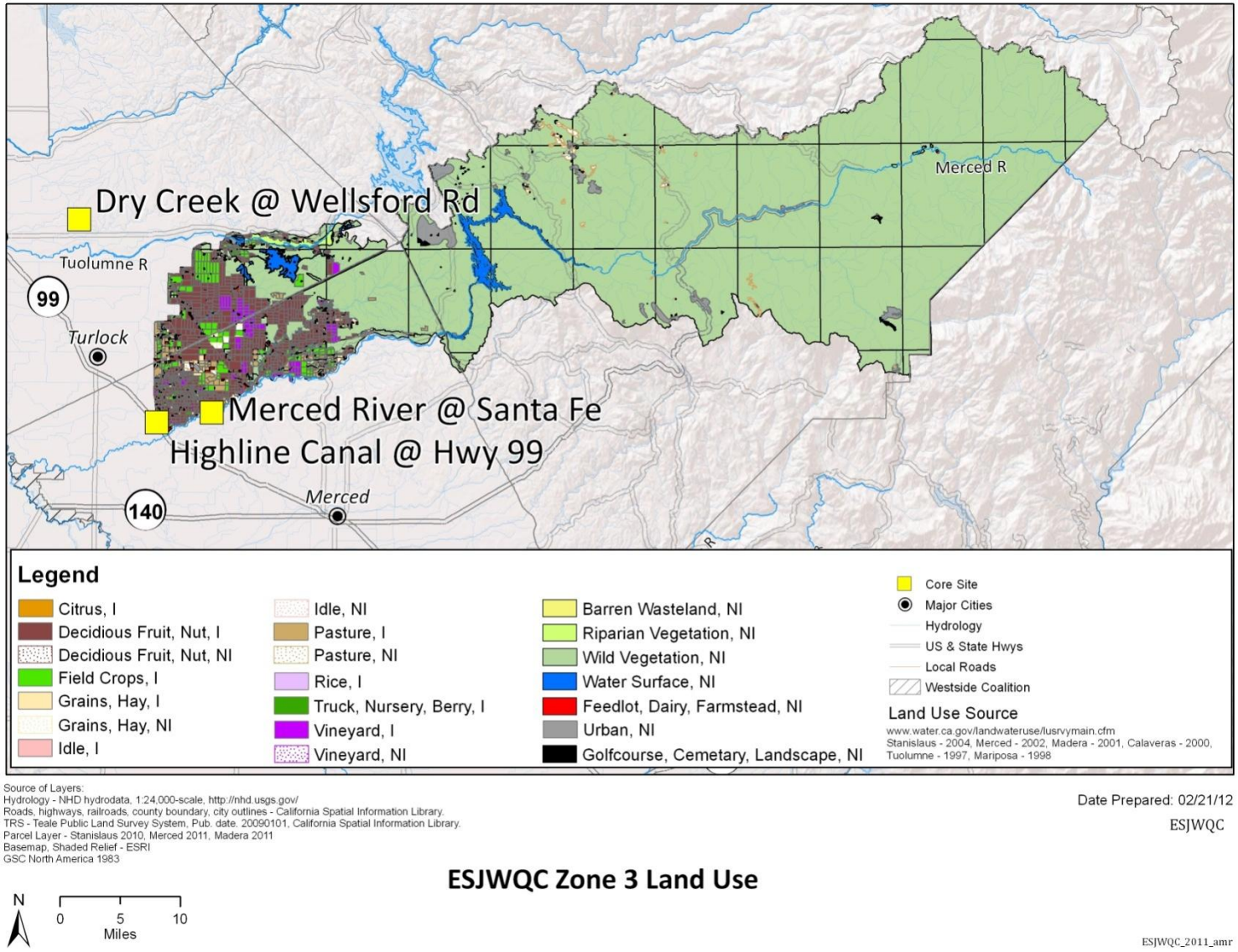


Figure 5. Land use for Merced River @ Santa Fe Zone (Zone 4).

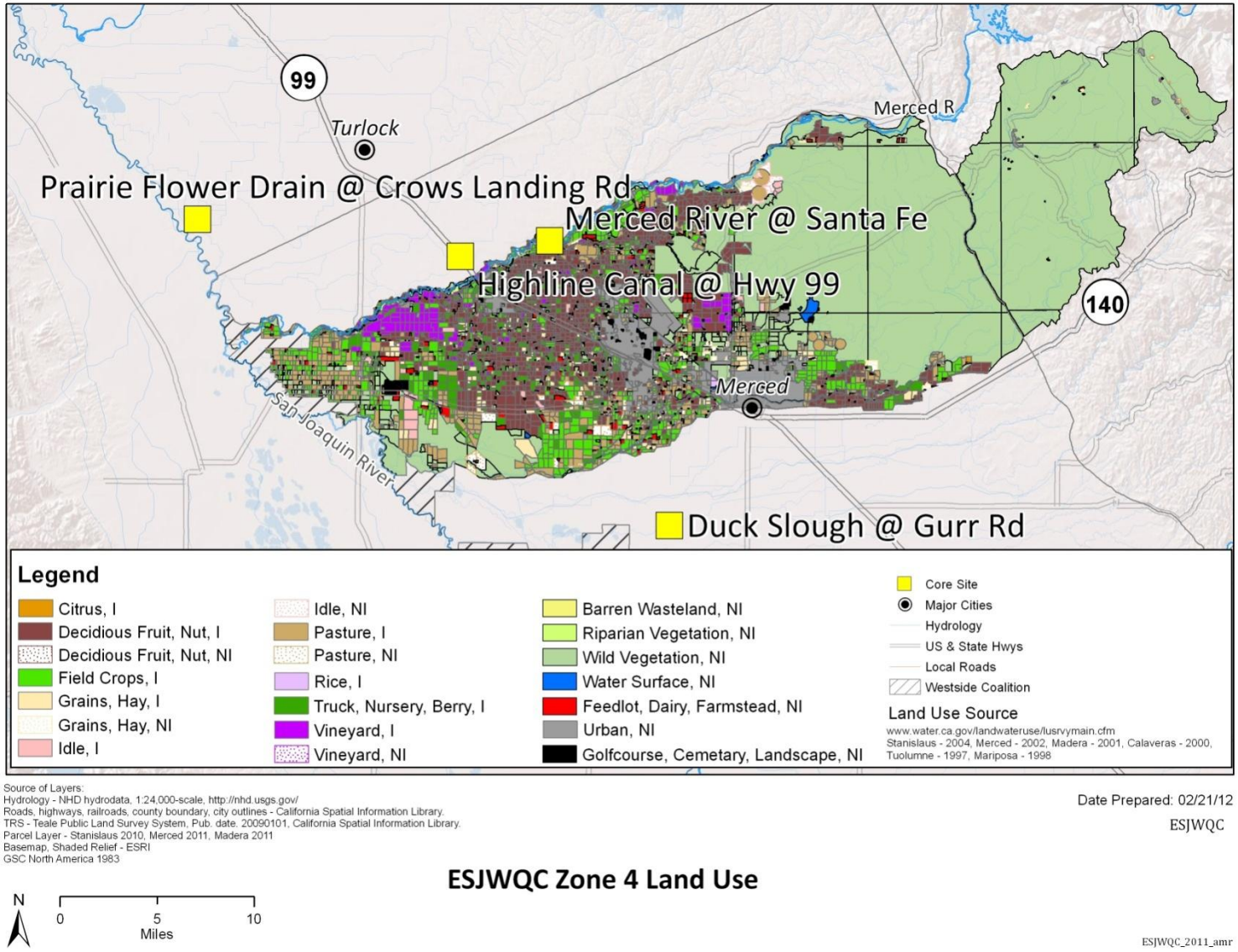


Figure 6. Land use for Duck Slough @ Gurr Rd Zone (Zone 5).

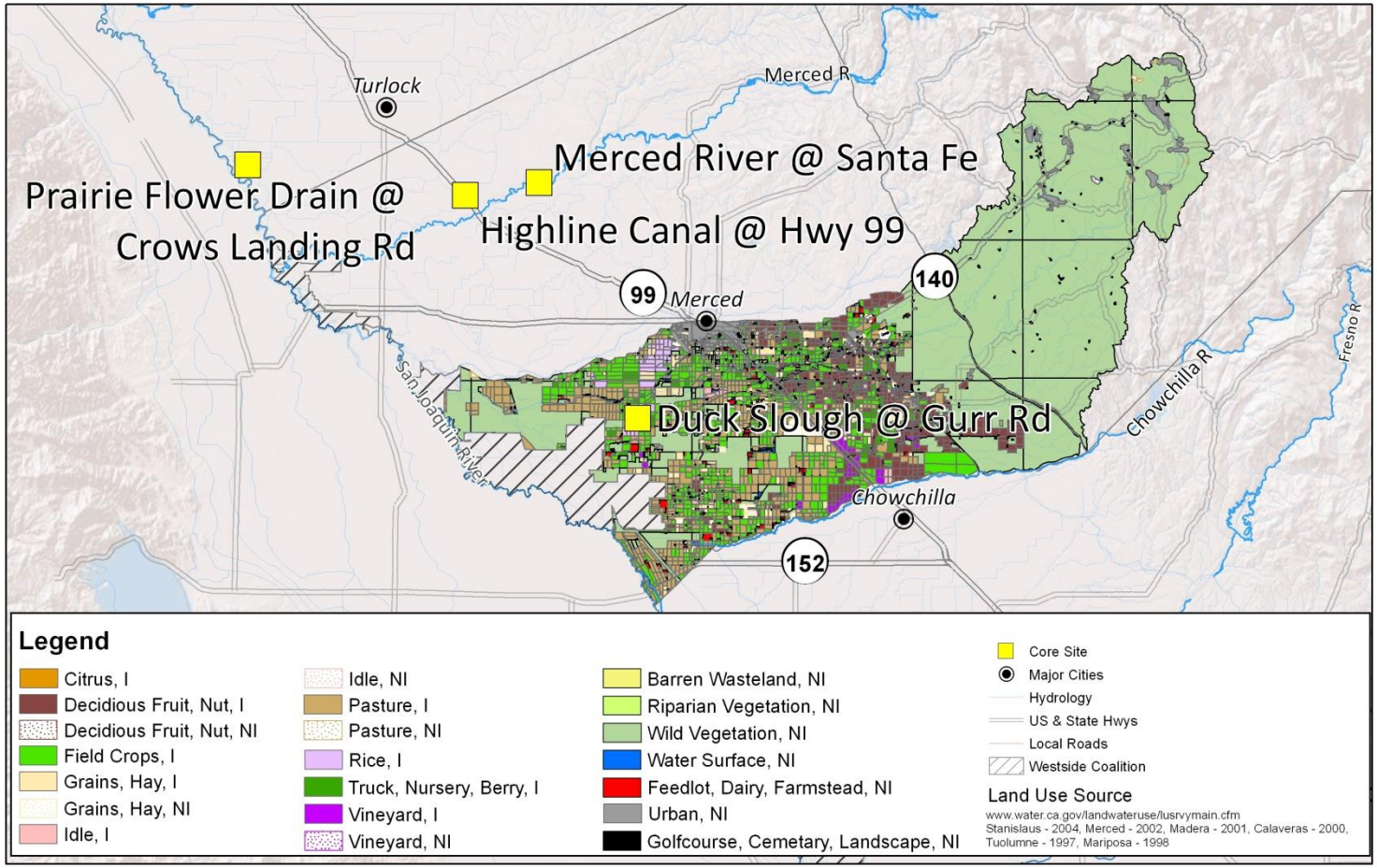
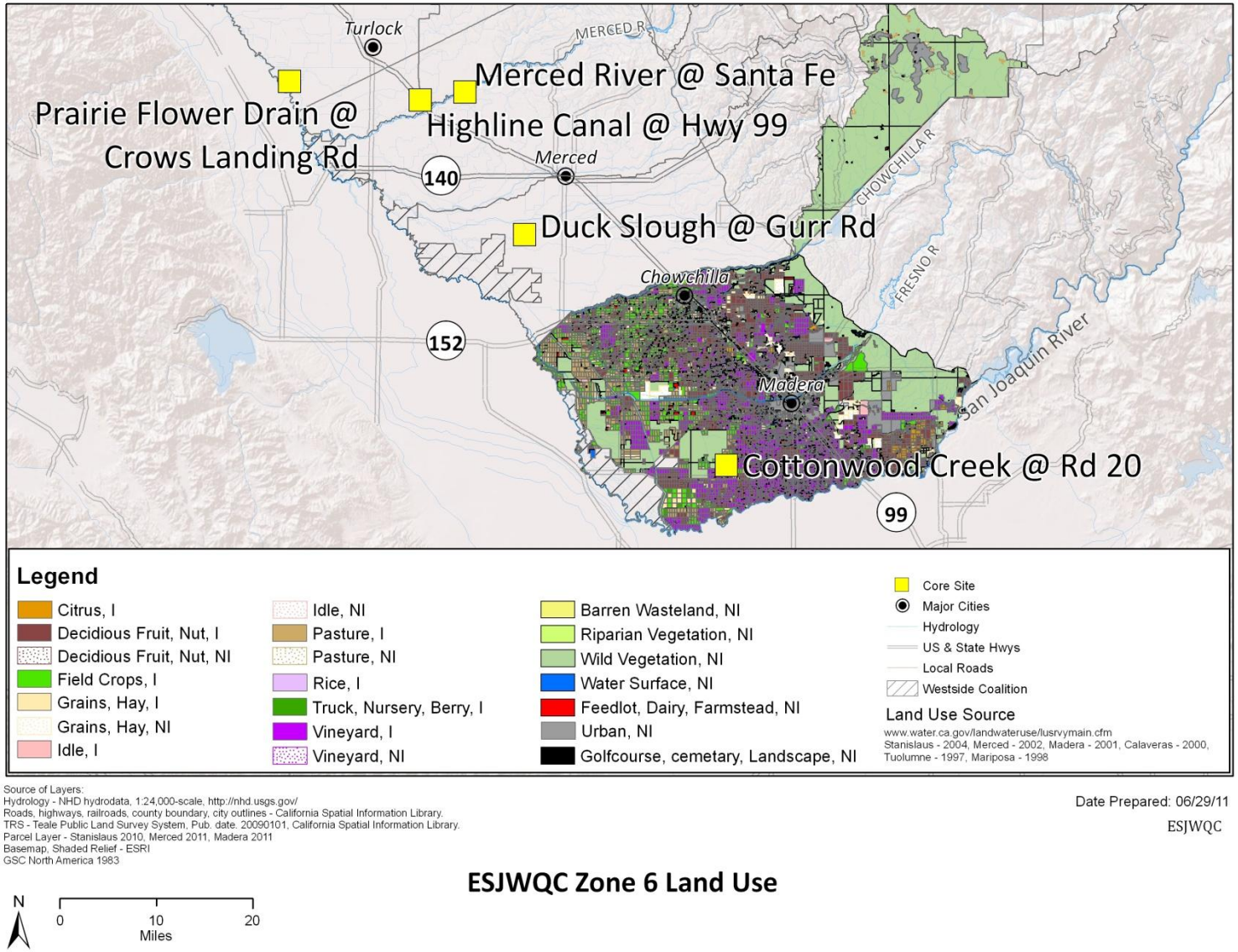


Figure 7. Land use for Cottonwood Creek @ Rd 20 Zone (Zone 6).

Land use for Madera County is only described for 501,056 acres, 37% of the county; therefore a portion of the county is missing from the map.



MONITORING JANUARY THROUGH DECEMBER 2011

The Coalition conducts Normal Monitoring (NM) to characterize discharge from irrigated agriculture, and Management Plan Monitoring (MPM) to monitor constituents that have exceeded water quality trigger limits at least twice during NM. From January through December 2011 the Coalition conducted both NM and MPM based on the monitoring strategy outlined in the MRPP (MRPP pages 33-35) and Management Plan approved November 25, 2008 (annual updates are submitted on April 1 of each year).

As part of NM during the 2011 monitoring year, the Coalition sampled both Core and Assessment Monitoring locations once a month including one storm event and two sediment monitoring events. The following section briefly describes the objectives of NM (Core (C), Assessment (A) and Sediment Monitoring) and MPM, as well as the overall Coalition sampling design including sampling seasons and storm triggers.

The approved ESJWQC MRPP indicates that monitoring will occur at Yori Grove Drain @ East Taylor Rd in 2011 and 2012. Samples were collected in 2011 from a waterbody thought to be Yori Grove Drain. Later it was determined that the water body was actually Lateral 3, a Turlock Irrigation District supply canal that receives water from urban sources. Therefore in this Annual Monitoring Report (AMR), all samples collected at this location are associated with the site name of Lateral 3 along East Taylor Rd. The Coalition petitioned and received approval to remove Yori Grove Drain from their monitoring program as well as approval to remove Lateral 3 from their 2012 monitoring schedule. Since water quality data from Lateral 3 along East Taylor Rd does not characterize irrigated agricultural discharge, the water quality results are discussed in Appendix X and are not included in the Discussion of Results section of the main body of this AMR.

MONITORING OBJECTIVES

The objectives of the ESJWQC monitoring program are to:

1. Determine the concentration and load of waste(s) in discharges to surface waters.
2. Evaluate compliance with existing narrative and numeric water quality objectives to determine if implementation of additional management practices is necessary to improve and/or protect water quality.
3. Assess the impact of waste discharges from irrigated agriculture to surface water.
4. Determine the degree of implementation of management practices to reduce discharge of specific wastes that impact water quality in watersheds within the Coalition region.
5. Determine the effectiveness of management practices and strategies to reduce discharges of wastes that impact water quality.

In order to achieve the objectives listed above, the ESJWQC monitored water quality at 18 sites (including Lateral 3 along East Taylor Rd). All monitoring results and data from January through

December 2011 for Lateral 3 along East Taylor Rd are located in Appendix X (Appendix X, Tables 5 through 13). Of these 18 sites, MPM took place at 12 sites as outlined in the ESJWQC Management Plan. Six of these 12 sites were monitored for MPM only (Lateral 2 ½ near Keyes Rd, Livingston Drain @ Robin Ave, Howard Lateral @ Hwy 140, Bear Creek @ Kibby Rd, Duck Slough @ Hwy 99, and Dry Creek @ Rd 18). The remaining six MPM sites were additionally monitored for Assessment Monitoring constituents (Dry Creek @ Wellsford Rd, Prairie Flower Drain @ Crows Landing Rd, Highline Canal @ Hwy 99, Duck Slough @ Gurr Rd, Cottonwood Creek @ Rd 20, and Berenda Slough along Ave 18 ½). Six sites were monitored for Assessment Monitoring constituents only (Lateral 3 along East Taylor Rd (Appendix X), Rodden Creek @ Rodden Rd, Highline Canal @ Lombardy Rd, Merced River @ Santa Fe, McCoy Lateral @ Hwy 140, and Deadman Creek @ Hwy 59).

Monitoring constituents are established by the Irrigated Lands Regulatory Program (ILRP) Monitoring and Reporting Program (MRP) Order No. R5-2008-0005 (Appendix A). The Coalition sampled for numerous water quality parameters and constituents including 45 organic pesticides, *E. coli*, physical parameters (total dissolved solids (TDS), total suspended solids (TSS) and turbidity), nine metals, total organic carbon, five nutrients, field parameters (Dissolved Oxygen (DO), pH, and Specific Conductivity (SC)), water column toxicity to three test species (*C. dubia*, *P. promelas* and *S. capricornutum*). The Coalition also sampled for sediment physical parameters (grain size and total organic carbon (TOC)), sediment toxicity to *H. azteca,* and nine sediment pesticides as needed (Tables 4 and 6).

On May 6, 2011 the Regional Board approved the Coalition's request to modify the ESJWQC MRPP and its monitoring strategy to reduce water column sampling for organochlorines (including Group A pesticides), sediment bound pesticides (glyphosate, paraquat dichloride), and metals not applied by agriculture (arsenic, cadmium, lead, and molybdenum). Starting in July 2011 Assessment Monitoring for organochlorines, glyphosate, and paraquat was reduced to two monitoring events per year (one storm and one irrigation event) and monitoring for metals not applied by agriculture was reduced to two storm and two irrigation events (Tables 4, 5 and 6).

Table 4. Monitoring parameters.

CONSTITUENTS, PARAMETERS, AND TESTS	MONITORING TYPE
Photo Monitoring	
Photograph of monitoring location	With every monitoring event
WATER COLUMN SAMPLING	
Physical Parameters and General Chemistry	
Flow (field measure)	Assessment and Core
pH (field measure)	Assessment and Core
Electrical Conductivity (at 25°C, field measure)	Assessment and Core
Dissolved Oxygen (DO, field measure)	Assessment and Core
Temperature (field measure)	Assessment and Core
Turbidity	Assessment and Core
Total Dissolved Solids (TDS)	Assessment and Core
Total Suspended Solids (TSS)	Assessment and Core
Hardness	Assessment and Core
Total Organic Carbon (TOC)	Assessment and Core

CONSTITUENTS, PARAMETERS, AND TESTS	MONITORING TYPE
Bacteria	
E. coli	Assessment and Core
Water Column Toxicity Test	
Algae - *Selenastrum capricornutum*	Assessment
Water Flea - *Ceriodaphnia dubia*	Assessment
Fathead Minnow - *Pimephales promelas*	Assessment
Toxicity Identification Evaluation (TIE)[1]	As needed based on criteria described in MRP Part II.E
Pesticides	
Carbamates	
Aldicarb	Assessment
Carbaryl	Assessment
Carbofuran	Assessment
Methiocarb	Assessment
Methomyl	Assessment
Oxamyl	Assessment
Organochlorines[2]	
Dichlorodiphenyldichloroethane (DDD)	Assessment
Dichlorodiphenyldichloroethylene (DDE)	Assessment
Dichlorodiphenyltrichloroethane (DDT)	Assessment
Dicofol	Assessment
Dieldrin	Assessment
Endrin	Assessment
Methoxychlor	Assessment
Additional Group A[2]	
Aldrin	As needed to characterize 303d listed waterbodies
Chlordane	As needed to characterize 303d listed waterbodies
Heptachlor	As needed to characterize 303d listed waterbodies
Heptachlor Epoxide	As needed to characterize 303d listed waterbodies
Hexachlorocyclohexane (including Lindane) (gamma-HCH)	As needed to characterize 303d listed waterbodies
Hexachlorocyclohexane (alpha-HCH)	As needed to characterize 303d listed waterbodies
Hexachlorocyclohexane (beta-HCH)	As needed to characterize 303d listed waterbodies
Hexachlorocyclohexane (delta-HCH)	As needed to characterize 303d listed waterbodies
Endosulfan I	As needed to characterize 303d listed waterbodies
Endosulfan II	As needed to characterize 303d listed waterbodies
Toxaphene	As needed to characterize 303d listed waterbodies
Organophosphates	
Azinphos-methyl	Assessment
Chlorpyrifos	Assessment
Diazinon	Assessment
Dichlorvos	Assessment
Dimethoate	Assessment
Demeton-s	Assessment
Disulfoton (Disyton)	Assessment
Malathion	Assessment
Methamidophos	Assessment
Methidathion	Assessment
Parathion-methyl	Assessment
Phorate	Assessment
Phosmet	Assessment
Herbicides	
Atrazine	Assessment
Cyanazine	Assessment

CONSTITUENTS, PARAMETERS, AND TESTS	MONITORING TYPE
Diuron	Assessment
Glyphosate[2]	Assessment
Linuron	Assessment
Paraquat dichloride[2]	Assessment
Simazine	Assessment
Trifluralin	Assessment
Metals	
Arsenic (total) [2]	Assessment
Boron (total)	Assessment
Cadmium (total and dissolved) [2]	Assessment
Copper (total and dissolved)	Assessment
Lead (total and dissolved) [2]	Assessment
Nickel (total and dissolved)	Assessment
Molybdenum (total) [2]	Assessment
Selenium (total)	Assessment
Zinc (total and dissolved)	Assessment
Nutrients	
Total Kjeldahl Nitrogen (TKN)	Assessment and Core
Nitrate plus Nitrite as Nitrogen	Assessment and Core
Total Ammonia	Assessment and Core
Unionized Ammonia (calculated value)	Assessment and Core
Total Phosphorous (as P)	Assessment and Core
Soluble Orthophosphate	Assessment and Core
SEDIMENT SAMPLING	
Sediment Toxicity	
Hyalella azteca	Assessment
Pesticides (as needed based on criteria described in MRP Part II.E.2)	
Bifenthrin	As needed based on criteria described in MRP Part II.E
Cyfluthrin	As needed based on criteria described in MRP Part II.E
Cypermethrin	As needed based on criteria described in MRP Part II.E
Deltamethrin: Tralomethrin	As needed based on criteria described in MRP Part II.E
Esfenvalerate	As needed based on criteria described in MRP Part II.E
Lambda-Cyhalothrin	As needed based on criteria described in MRP Part II.E
Permethrin	As needed based on criteria described in MRP Part II.E
Fenpropathrin	As needed based on criteria described in MRP Part II.E
Chlorpyrifos	As needed based on criteria described in MRP Part II.E
Other sediment parameters	
Total Organic Carbon	Assessment
Grain Size	Assessment

[1]Specific TIE manipulations utilized in each test will be reported.

[2] Starting in July 2011 monitoring for organochlorines (including Group A pesticides), glyphosate, and paraquat was reduced to two monitoring events per year (one storm and one irrigation event); monitoring for metals not applied by agriculture was reduced to two storm and two irrigation events per year.

Table 5. ESJWQC January through December 2011 monitoring schedule (nutrients, bacteria, field parameters, physical parameters, metals and pesticides: organophoshates)

ESJWQC January-December 2011 Monitoring Schedule		Nutrients					Bacteria	Field Parameters				Physical Parameters				Metals										Pesticides												
																										Organophosphates												
Zone	Site Name	Total Ammonia	Nitrate + Nitrite (as N)	Soluble Orthophosphate	Total Kjeldahl Nitrogen	Total Phosphorous	*E. coli*	Dissolved Oxygen	pH	Specific Conductance	Temperature	Turbidity	TOC	Total Dissolved Solids	Suspended Solids	Arsenic (Total)	Boron (Total)	Cadmium (Dissolved/Total)	Copper (Dissolved/Total)	Lead (Dissolved/Total)	Molybdenum (Total)	Nickel (Dissolved/Total)	Selenium (Total)	Zinc (Dissolved/Total)	Hardness (Dissolved)	Azinphos-methyl	Chlorpyrifos	Diazinon	Dichlorvos	Dimethoate	Demeton-s	Disulfoton	Malathion	Methamidophos	Methidathion	Parathion, methyl	Phorate	Phosmet
1	Dry Creek @ Wellsford Rd	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	M[3]	A[4]	A[4]	A	A	A	A	A	M[3]	A	A	A	A	A	A	A	A	A
	Rodden Creek @ Rodden Rd	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	A	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2	Prairie Flower Drain @ Crows Landing Rd	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	A	A[4]	A[4]	A	A	A	A	A	M[3]	A	A	A	A	A	A	A	A	A
	Lateral 2 1/2 near Keyes Rd							F	F	F	F																M									
3	Highline Canal @ Hwy 99	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	M[3]	A[4]	A[4]	A	A	A	A	A	M[3]	A	A	A	A	A	A	A	A	A
	Highline Canal @ Lombardy Rd	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	A	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
4	Bear Creek @ Kibby Rd							F	F	F	F								M								M									
	Livingston Drain @ Robin Ave							F	F	F	F								M	M							M									
	Howard Lateral @ Hwy 140							F	F	F	F								M								M									
	McCoy Lateral @ Hwy 140	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	A	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	Merced River @ Santa Fe	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	A	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
5	Deadman Creek @ Hwy 59	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	A	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	Duck Slough @ Gurr Rd	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	M[3]	A[4]	A[4]	A	A	A	A	A	M[3]	A	A	A	A	A	A	A	A	A
	Duck Slough @ Hwy 99							F	F	F	F								M	M							M									
6	Berenda Slough along Ave 18 1/2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	A	A[4]	A[4]	A	A	A	A	A	M[3]	A	A	A	A	A	A	A	A	A
	Dry Creek @ Rd 18							F	F	F	F								M	M							M	M								
	Cottonwood Creek @ Rd 20	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A	A[4]	M[3]	A[4]	A[4]	A	A	A	A	A	M[3]	M[3]	A	A	A	A	A	A	A	A

A - Assessment Monitoring constituent
C - Core Monitoring constituent
F – Field parameters are collected during every sampling event including MPM
M - Management Plan Monitoring for Priority A-D constituents during months of past exceedances
[1]Diuron and linuron analyzed as carbamates
[2]If *H. azteca* survival is less than 80% compared to the control, the following pesticides will be analyzed for pesticides (Table 4 lists specific pesticides).
[3]MPM at sites under Assessment Monitoring in 2011
[4]Starting in July 2011 Assessment Monitoring for organochlorines (including Group A pesticides), glyphosate, and paraquat was reduced to two monitoring events per year (one storm and one irrigation event) and monitoring for metals not applied by agriculture was reduced to two storm and two irrigation events per year.

Table 6. ESJWQC January through December 2011 monitoring schedule (pesticides: organochlorines, carbamates, herbicides, Group A, water column toxicity and sediment parameters)

ESJWQC January-December 2011 Monitoring Schedule		Pesticides																																Water Column Toxicity			Sediment		
		Organochlorines							Carbamates								Herbicides[1]						Group A															Toxicity	Physical parameters	
Zone	Site Name	DDD	DDE	DDT	Dicofol	Dieldrin	Endrin	Methoxychlor	Aldicarb	Carbaryl	Carbofuran	Diuron	Linuron	Methiocarb	Methomyl	Oxamyl	Atrazine	Cyanazine	Simazine	Trifluralin	Paraquat	Glyphosate	Aldrin	Chlordane	Heptachlor	Heptachlor epoxide	HCH, alpha	HCH, beta	HCH, delta	HCH, gamma	Endosulfan I	Endosulfan II	Toxaphene	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*[2]	TOC	Grain size
1	Dry Creek @ Wellsford Rd	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	M[3]	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	M[3]	M[3]	A	A
	Rodden Creek @ Rodden Rd	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A
2	Prairie Flower Drain @ Crows Landing Rd	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	M[3]	A	M[3]	M[3]	A	A
	Lateral 2 1/2 near Keyes Rd																																						
3	Highline Canal @ Hwy 99	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	M[3]	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	M[3]	A	M[3]	M[3]	A	A
	Highline Canal @ Lombardy Rd	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A
4	Bear Creek @ Kibby Rd																																	M					
	Livingston Drain @ Robin Ave																																			M			
	Howard Lateral @ Hwy 140																																						
	McCoy Lateral @ Hwy 140	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A
	Merced River @ Santa Fe	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A
5	Deadman Creek @ Hwy 59	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A
	Duck Slough @ Gurr Rd	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	M[3]	A	M[3]	M[3]	A	A
	Duck Slough @ Hwy 99																																			M			
6	Berenda Slough along Ave 18 1/2	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	M[3]	A	A	A
	Dry Creek @ Rd 18											M																								M	M		
	Cottonwood Creek @ Rd 20	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	M[3]	A	A	A	A	A	A	A	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A

A - Assessment Monitoring constituent
C - Core Monitoring constituent
F – Field parameters are collected during every sampling event including MPM
M - Management Plan Monitoring for Priority A-D constituents during months of past exceedances
[1]Diuron and linuron analyzed as carbamates.
[2]If *H. azteca* survival is less than 80% compared to the control, the following pesticides will be analyzed for pesticides (Table 4 lists specific pesticides).
[3]Indicates MPM at sites under Assessment Monitoring in 2011
[4]Starting in July 2011 Assessment Monitoring for organochlorines (including Group A pesticides), glyphosate, and paraquat was reduced to two monitoring events per year (one storm and one irrigation event) and monitoring for metals not applied by agriculture was reduced to two storm and two irrigation events per year.

MONITORING SEASONS

The Coalition organizes its monitoring by four "seasons": fall, winter, irrigation, and storm (Table 7). Fall monitoring (October – December) occurs after irrigation is finished across the majority of crops in the Coalition region and generally before dormant sprays. Winter monitoring occurs from January through March when dormant sprays and significant rainfalls are expected. Irrigation monitoring (April – September) characterizes the discharge from irrigated agriculture and irrigation return flows. A storm event can occur at any time of the year but is expected to occur during the winter season. Additional details regarding storm sampling events and their rainfall trigger are included in the section "Sample Site Descriptions and Rainfall Records."

Table 7. Description of monitoring seasons

SEASON	MONTH RANGE	DESCRIPTION
Fall	October through December	No irrigation.
Winter	January through March	No irrigation, possible dormant sprays.
Storm	Anytime	Storm is triggered by > 0.25 inches of rain within 24 hours; may occur during any month but generally occurs from January through March.
Irrigation	April through September	Summer months with possible irrigation.

MONITORING DESIGN

Normal Monitoring

Starting October 2008, the Coalition initiated monitoring under the current approved MRPP that includes a schedule of Core and Assessment Monitoring locations to be monitored on a monthly basis (MRPP Table 10, pages 52-53). Prior to the 2008 MRPP, the Coalition monitored only during the irrigation season (April – September) and twice during the storm season (December – March) as determined by a 24 hour rainfall trigger of 0.50 inches. The first year in which the Coalition monitored from October through December ("fall" season) was in 2008 and at that time the 24 hour rainfall trigger was reduced to 0.25 inches. For reference, Table 8 provides the locations and seasons that the Coalition monitored from 2004 through 2011.

Normal Monitoring refers to the monitoring strategy that is outlined in the most current MRPP. Each zone contains a Core Monitoring location that undergoes Assessment Monitoring once every three years. In each zone there are numerous Assessment sites. A single Assessment site is monitored for two years, and then monitoring rotates to a new site within the zone. The monitoring schedule outlined in the ESJWQC MRPP (MRPP Table 10, pages 52-53) dictates the rotation of Assessment Monitoring locations in each zone. Normal Monitoring occurred monthly throughout the year at six Core and six Assessment sites. In 2011, all Core sites were monitored for Assessment Monitoring constituents.

The Coalition attempts to sample two storm events per year. A storm monitoring event is defined as monitoring within three days of a rainfall that exceeds 0.25 inches within 24 hours. Storm samples were collected at sites in the ESJWQC on February 17, 2011. A description of the rainfall that occurred in 2011 including when samples were collected relative to the amount of precipitation is included in the section "Sample Site Descriptions and Rainfall Records" under the subheading "Rainfall Records".

Core Monitoring

Core Monitoring occurs at Core sites within each of the ESJWQC zones and is designed to track water quality trends over extended periods of time. There are fewer constituents (primarily physical parameters and nutrients) monitored at Core sites (Table 4). Data from Core sites are used to establish trends in water quality that in turn are used to evaluate the effectiveness of the Coalition's efforts to reduce or eliminate the impact of irrigated agriculture on surface waters. Core sites in each zone rotate into Assessment Monitoring every three years. During 2011, Core Monitoring sites were in the Assessment Monitoring year.

Assessment Monitoring

Assessment Monitoring occurs at Assessment sites and Core sites every third year. Assessment Monitoring includes a diversity of monitoring sites that are representative of each individual zone. Assessment sites are selected to characterize water quality within each zone. Assessment Monitoring includes the analysis of samples for a large suite of constituents to effectively characterize water quality (Table 4).

Sediment Monitoring

Sediment samples are collected twice each year at sites that are undergoing Assessment Monitoring. Sediment samples are collected after the winter rainfall events and before the height of the irrigation season (between March 1 and April 30). Sediment samples also are collected at the end of the irrigation season, when irrigation is mostly complete, and water levels are low and safe enough to sample sediment (between August 15 and October 15). In 2011, sediment samples were collected from sites in the ESJWQC in March (March 17, 2011) and in September (September 6, 2011 and September 13, 2011).

Table 8. Sample sites and years monitored.

Station Name	2004	2005		2006		2007		2008			2009				2010				2011			
	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall	Winter	Storm	Irrigation	Fall	Winter	Storm	Irrigation	Fall	Winter	Storm	Irrigation	Fall
Ash Slough @ Ave 21			x	x	x	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	x	Dry				
August Road Drain upstream of Crows Landing Bridge (Hogin Rd)	x																					
Bear Creek @ Kibby Rd		x	x	x	x	x	x	x	x								x		x	x	x	
Berenda Slough along Ave 18 1/2					x	Dry	x	x	Dry										x	x	x	x
Black Rascal Creek @ Yosemite Rd					x	x	x	x	x													
Cottonwood Creek @ Rd 20		x	x	x	x	Dry	x	x	x	Dry	Dry	x	Dry	x	Dry	x	x	x	x	x	x	Dry
Cottonwood Creek @ Hwy 145[1]									x													
Deadman Creek @ Hwy 59					x	x	x	x	x				Dry			Dry			x	x	x	x
Deadman Creek (Dutchman) @ Gurr Rd	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x				
Dry Creek @ Rd 18			x	Dry	x	x	x	x	x										x	x	x	
Dry Creek @ Rd 22[1]									x													
Dry Creek @ Rd 28½[1]									x													
Dry Creek @ Oakdale Rd												Dry		Dry		x						
Dry Creek @ Waterford Rd[1]									x				x									
Dry Creek @ Wellsford Rd		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Duck Slough @ Gurr Rd	x	x	x	x	x	x	x	x	x	Dry	x	x	x	x	x	x	x	x	x	x	x	Dry
Duck Slough @ Hwy 59[1]									x													
Duck Slough @ Hwy 99		x	x	x	x	x	x	x	x				x				x			x	x	
Duck Slough @ Whealan Rd[1]									x													
Hatch Drain @ Tuolumne Rd							x	x	x													
Highline Canal @ Hwy 99			x	x	x	x	x	x	x	Dry	Dry	x	x	x	x	x	x	x	Dry	Dry	x	Dry
Highline Canal @ Lombardy Ave		x	x	x	x	x	x	x	x				x		x	x			x	x	x	Dry
Hilmar Drain @ Central Ave		x	x	x	x	x	x	x	x				x									
Hilmar Drain @ Mitchell Rd[1]									x													
Howard Lateral @ Hwy 140										x	Dry	Dry	x	x	Dry	Dry	x	x			x	x
Jones Drain @ Oakdale Rd		x	x	x	x	x	x															
Lateral 2 ½ near Keyes Rd										x	Dry	Dry	x	x	x	Dry	x	x			x	
Livingston Drain @ Robin Ave							x	x	x										Dry	Dry	x	
Lone Willow Slough @ Madera Ave		x	x																			
McCoy Lateral @ Hwy 140																			Dry	Dry	x	Dry
Merced River @ Santa Fe	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Station Name	2004	2005		2006		2007		2008			2009				2010				2011			
	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall	Winter	Storm	Irrigation	Fall	Winter	Storm	Irrigation	Fall	Winter	Storm	Irrigation	Fall
Miles Creek @ Reilly Rd							x	x	x				x			x						
Mootz Drain @ Langworth Rd										x	x	x	x	x								
Mootz Drain downstream of Langworth Pond												x			x	x	x	Dry				
Mustang Creek @ East Ave					x	x	x	x	Dry	Dry	x	x	Dry	x	x	x	Dry	Dry				
North Slough @ Hwy 59[1]									Dry													
Prairie Flower Drain @ Crows Landing Rd		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Prairie Flower Drain @ Morgan Rd[1]									x													
Reclamation Drain @ Williams Ave[1]									x													
Rodden Creek @ Rodden Rd																			x	x	x	x
Silva Drain @ Meadow Dr					x	x	x	x	x													
South Slough @ Quinley Rd					x	Dry	x	x	x													
Westport Drain @ Vivian Rd							x	x	x													

[1]Upstream sampling of Normal Monitoring locations conducted for source identification.
A blank cell indicates that no sampling occurred at that site during the specified season.
"Dry" indicates that the site was dry during one or more events during the specified monitoring season.

Management Plan Monitoring

The Coalition conducted MPM as part of the ESJWQC's management plan strategy to identify contaminant sources and evaluate effectiveness of newly implemented management practices at sites where exceedances had previously occurred. Management Plan Monitoring occurred at 12 sites from January through December 2011: Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99, Prairie Flower Drain @ Crows Landing Rd, Cottonwood Creek @ Rd 20, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, Bear Creek @ Kibby Rd, Berenda Slough along Ave 18 ½, Dry Creek @ Rd 18, Howard Lateral @ Hwy 140, Lateral 2 ½ near Keyes Rd and Livingston Drain @ Robin Ave. Management Plan Monitoring was conducted for water column toxicity (*C. dubia* and *S. capricornutum*), sediment toxicity (*H. azteca)*, copper, lead, chlorpyrifos, diazinon, and diuron (Table 9). Details on the process and the schedule of MPM are available in the ESJWQC 2008 Management Plan approved November 25, 2008. The MPM schedule is updated annually in the ESJWQC Management Plan Update Report (MPUR), which is submitted annually on April 1.

Table 9. ESJWQC 2011 MPM sites and constituents (by monitoring month and site name).

Site Name	2011 MPM Year[1]	Month	Copper	Lead	Chlorpyrifos	Diazinon	Diuron	*C. dubia*	*S. capricornutum*	*H. azteca*
Bear Creek @ Kibby Rd	Year 2	January	X							
Cottonwood Creek @ Rd 20	Year 2	January	X		X		X			
Dry Creek @ Rd 18	Year 1	January	X				X		X	
Duck Slough @ Gurr Rd	Year 2	January	X							
Highline Canal @ Hwy 99	Year 2	January	X		X		X			
Livingston Drain @ Robin Ave	Year 1	January	X	X	X					
Prairie Flower Drain @ Crows Landing Rd	Year 3	January							X	
Bear Creek @ Kibby Rd	Year 2	February	X							
Cottonwood Creek @ Rd 20	Year 2	February	X		X	X	X			
Dry Creek @ Rd 18	Year 1	February	X		X	X	X		X	
Dry Creek @ Wellsford Rd	Year 3	February	X				X		X	
Duck Slough @ Gurr Rd	Year 2	February	X					X		
Duck Slough @ Hwy 99	Year 3	February	X							
Highline Canal @ Hwy 99	Year 2	February	X		X		X		X	
Livingston Drain @ Robin Ave	Year 1	February	X	X					X	
Prairie Flower Drain @ Crows Landing Rd	Year 3	February							X	
Dry Creek @ Rd 18	Year 1	March								X
Dry Creek @ Wellsford Rd	Year 3	March							X	X
Duck Slough @ Gurr Rd	Year 2	March						X		
Highline Canal @ Hwy 99	Year 2	March						X	X	X
Prairie Flower Drain @ Crows Landing Rd	Year 3	March						X		X

Site Name	2011 MPM Year[1]	Month	Copper	Lead	Chlorpyrifos	Diazinon	Diuron	*C. dubia*	*S. capricornutum*	*H. azteca*
Cottonwood Creek @ Rd 20	Year 2	April	X							
Dry Creek @ Rd 18	Year 1	April	X		X					
Dry Creek @ Wellsford Rd	Year 3	April	X							
Duck Slough @ Hwy 99	Year 3	April	X	X					X	
Highline Canal @ Hwy 99	Year 2	April	X						X	
Howard Lateral @ Hwy 140	MPM 1	April	X							
Lateral 2 1/2 near Keyes Rd	Year 1	April			X					
Livingston Drain @ Robin Ave	Year 1	April							X	
Prairie Flower Drain @ Crows Landing Rd	Year 3	April							X	
Bear Creek @ Kibby Rd	Year 2	May			X			X		
Berenda Slough along Ave 18 1/2	Year 1	May							X	
Cottonwood Creek @ Rd 20	Year 2	May	X							
Dry Creek @ Rd 18	Year 1	May	X	X					X	
Duck Slough @ Gurr Rd	Year 2	May	X							
Duck Slough @ Hwy 99	Year 3	May		X	X					
Highline Canal @ Hwy 99	Year 2	May						X	X	
Livingston Drain @ Robin Ave	Year 1	May	X						X	
Prairie Flower Drain @ Crows Landing Rd	Year 3	May							X	
Cottonwood Creek @ Rd 20	Year 2	June	X							
Dry Creek @ Rd 18	Year 1	June	X	X						
Duck Slough @ Gurr Rd	Year 2	June	X							
Duck Slough @ Hwy 99	Year 3	June	X	X						
Highline Canal @ Hwy 99	Year 2	June	X							
Howard Lateral @ Hwy 140	MPM 1	June			X					
Livingston Drain @ Robin Ave	Year 1	June	X		X					
Bear Creek @ Kibby Rd	Year 2	July			X			X		
Berenda Slough along Ave 18 1/2	Year 1	July			X				X	
Cottonwood Creek @ Rd 20	Year 2	July	X							
Dry Creek @ Rd 18	Year 1	July	X		X					
Dry Creek @ Wellsford Rd	Year 3	July			X					
Duck Slough @ Gurr Rd	Year 2	July	X		X				X	
Duck Slough @ Hwy 99	Year 3	July	X	X	X				X	
Highline Canal @ Hwy 99	Year 2	July	X		X					
Howard Lateral @ Hwy 140	MPM 1	July	X							
Lateral 2 1/2 near Keyes Rd	Year 1	July			X					

Site Name	2011 MPM Year[1]	Month	Copper	Lead	Chlorpyrifos	Diazinon	Diuron	*C. dubia*	*S. capricornutum*	*H. azteca*
Livingston Drain @ Robin Ave	Year 1	July	X		X					
Bear Creek @ Kibby Rd	Year 2	August	X							
Cottonwood Creek @ Rd 20	Year 2	August	X							
Dry Creek @ Rd 18	Year 1	August	X	X						
Dry Creek @ Wellsford Rd	Year 3	August			X					
Duck Slough @ Hwy 99	Year 3	August	X	X						
Highline Canal @ Hwy 99	Year 2	August	X							
Livingston Drain @ Robin Ave	Year 1	August			X					
Prairie Flower Drain @ Crows Landing Rd	Year 3	August			X					
Berenda Slough along Ave 18 1/2	Year 1	September			X					
Cottonwood Creek @ Rd 20	Year 2	September	X							
Dry Creek @ Rd 18	Year 1	September	X	X						X
Dry Creek @ Wellsford Rd	Year 3	September			X					X
Duck Slough @ Gurr Rd	Year 2	September							X	X
Duck Slough @ Hwy 99	Year 3	September	X	X	X					
Highline Canal @ Hwy 99	Year 2	September						X		X
Livingston Drain @ Robin Ave	Year 1	September	X							
Prairie Flower Drain @ Crows Landing Rd	Year 3	September			X			X		X
Howard Lateral @ Hwy 140	MPM 1	October	X							

[1]Year 1, Year 2 and Year 3 refer to the year of high priority that the site subwatershed is in.
MPM 1 Refers to the year of MPM that the subwatershed is in following exceedances that require new management plan (MPM for new management plan sites/constituents for at least two years after the initiation of a management plan is required before the site becomes a high priority subwatershed).

MONITORING CONSTITUENTS

All monitoring constituents and locations for are provided in Tables 4, 5 and 6. The following section describes agricultural sources of the constituent groups analyzed by the Coalition.

Pesticides and Toxicity

Pesticides may be found in the water column or sediment as a result of applications to fields that are subsequently irrigated, have runoff from rainfall events, or from spray drift to surface waters. Irrigation return flows from fields or storm water runoff can move sediment and chemicals to surface waters. The concentrations of chemicals in surface waters are compared to water quality triggers to determine if concentration in the water exceeds the trigger limit (termed an exceedance). Toxicity testing is complementary to chemical analyses and can provide an independent and more direct assessment of the level of impairment in the waterbody. The objective of the Coalition is to use the results of toxicity testing along with water chemistry analysis to assess the impact of discharges from irrigated agriculture.

On May 6, 2011 the Regional Board approved the Coalition's request to modify the MRPP and its monitoring strategy to reduce water column sampling for organochlorines, glyphosate and paraquat. Glyphosate and paraquat are pesticides that have an extremely high affinity for sediments and organic material and therefore are rarely detected in the water column except for times when sediment runoff is a concern (i.e. a high TSS event following a large rain storm). Starting July 2011, monitoring for organochlorines, glyphosate and paraquat was reduced to one storm and one irrigation event per year.

Nutrients and Physical Parameters

Excessive nutrients can cause eutrophication of surface waters resulting in low DO and an inability to support healthy aquatic communities. The Coalition's objective is to determine if exceedances of nutrient trigger limits are occurring and if potential sources can be identified. However, sources of nutrients and physical parameters such as organic carbon are difficult to identify. If current monitoring data are not sufficient, the Coalition may conduct further investigations to identify sources. Such investigations may include special studies if they are determined to be cost effective. By understanding the sources of nutrients responsible for the exceedances, the Coalition can properly recommend management practices to address exceedances of nutrients and physical parameters.

Field Parameters

Much like physical parameters, exceedances of water quality objectives for pH, DO, and SC are difficult to track to sources. All of these parameters are non-conserved meaning that they can increase or decrease as water moves downstream. Changes in the values of these parameters are the result of processes that occur on the land surface, and in the water column and sediment. These processes can vary diurnally. As with nutrients and physical parameters, the Coalition's objective is to determine if exceedances are occurring and to investigate potential sources through analysis of monitoring data and special studies (if cost effective). By understanding the sources of constituents that influence field parameters, the Coalition can properly recommend management practices to address the exceedances.

E. coli

E. coli are a natural component of ecosystems and also occur in the intestinal tracts of animals. Coliform bacteria are voided in fecal material which can enter surface waters. *E. coli* may persist in the presence of oxygen in the environment for periods of time after being voided, and are known to reproduce and proliferate in the environment. Any species of vertebrate that voids feces can contribute *E. coli* to surface waters, including humans, companion animals such as dogs and cats, cows, chickens, waterfowl (ducks and geese), raccoons, otters, ground squirrels, feral pigs, and in some locations deer. Consequently, there may be a large amount of bacteria in any environmental sample that is collected.

Metals

Nine metals are analyzed in Coalition monitoring: arsenic, boron, cadmium, copper, lead, molybdenum, nickel, selenium and zinc. Arsenic, cadmium, lead and molybdenum are only analyzed during two storm and two irrigation events per year. Five of these metals are analyzed for both dissolved and total concentrations, and four metals are analyzed for total recoverable metal only. Dissolved metals were added to the Coalition monitoring plan in 2008 as a result of a new provision in the MRP Order R5-2008-0005. The Environmental Protection Agency (EPA) recommends "the use of dissolved metal to set and measure compliance with aquatic life water quality standards." The EPA states that dissolved metal "more closely approximates the bioavailable fraction of the metal in the water column than total recoverable metal." In order to assess compliance with water quality standards the Coalition analyzes for dissolved fractions of cadmium, copper, lead, nickel and zinc. The remaining metals are analyzed for total concentrations only.

On May 6, 2011 the Regional Board approved the Coalition's request to modify the MRPP and its monitoring strategy to reduce water column sampling for metals not applied by agriculture: including arsenic, cadmium, lead and molybdenum. Starting July 2011, Assessment Monitoring for metals not applied by agriculture was reduced to two storm and two irrigation events per year and monitoring for metals under current management plans continues with the original approved management plan monitoring strategy.

There are four general classes of metals: 1) those that are naturally present because of underlying geologic materials but not applied by agriculture (boron, selenium), 2) those that are naturally present because of underlying geologic materials and may be applied by agriculture (copper, zinc, nickel), 3) those that may be legacy pesticides but also have numerous nonagricultural sources (lead, arsenic), and 4) those that are found solely as a result of nonagricultural anthropogenic sources (cadmium). These categories are not mutually exclusive and in fact, all metals belong to the first category. For example, nickel is a plant micronutrient that may be incorporated into fertilizer mixes, although normally there is a sufficient quantity of nickel in soils to supply the needs of crops. As a result, although applied by agriculture, exceedances of nickel would be expected to primarily be a result of a high concentration of nickel in soil.

Natural weathering of geologic materials can release metals and metalloid elements such as selenium, arsenic, and boron to surface waters. Selenium salts are naturally elevated in the southwest portion of

the San Joaquin Valley and are transported to surface waters during storm runoff or irrigation tailwater discharge. These salts are so problematic that there is a prohibition of discharge of irrigation tailwater in some locations in the Valley. Arsenic appears to be naturally elevated in several locations in the San Joaquin Valley. Zinc and nickel are also found in soils and can be found in surface waters at levels that reflect background concentrations. Both of these metals can be applied during agricultural operations as well; therefore, the difference between applications and natural weathering must be understood to properly manage the amounts reaching surface waters. Understanding background levels of these elements will be an important task for the Coalition when trying to understand the impact of agricultural inputs to surface waters.

While all metals can be released as a result of the weathering of geologic materials, elevated levels of most metals are a result of anthropogenic inputs. Lead was used as a pesticide during the last century although it was applied in declining amounts over the last several decades before finally being prohibited in the 1990s. Lead was used in gasoline until the early 1980s when it was replaced by other fuel oxygenates. Lead-based paint was routinely used until the latter parts of the last century and is still present in many old buildings and structures. Lead is a component of batteries, and is the material in solder in numerous electronic devices including televisions, computers, and cell phones. These sources can be distinguished through sophisticated analytical tests that are beyond the capabilities of the Coalition. Copper is routinely used by agriculture on a number of crops and could be found in surface waters as a result of these applications. Additional sources include road surfaces where wearing of brake pads can result in substantial loading to surface waters.

Because fertilizer applications and the micronutrient constituents included in fertilizer mixes are not reported, there is no way the Coalition can distinguish between natural and anthropogenic sources with NM data. Several of these metals can be identified to source using sophisticated analytical equipment and techniques, but these tests are beyond the financial capabilities of the Coalition. Consequently, the Coalition uses monitoring data to determine if exceedances are occurring.

SAMPLE SITE DESCRIPTIONS AND RAINFALL RECORDS

The site names, zones, sample types, station codes and locations of all sites monitored from January through December 2011 are provided in Table 10. Land use for each subwatershed is listed in Table 11. Subwatershed information for Lateral 3 along East Taylor can be found in Appendix X.

A narrative description of each site subwatershed with respect to hydrology and agricultural production follows below. Location maps of sampling sites, crops and land uses are provided in the Land Use Maps and 2011 Annual Site Photos in Appendix VIII. Due to a camera malfunction, site photos were not taken of the Livingston Drain @ Robin Ave site subwatershed during the April 19, 2011 monitoring event.

ESJWQC region rainfall data for the months January through December 2011 are described in the section “Rainfall Records”.

SAMPLE SITE LOCATIONS

Figure 8 is a map of all site subwatersheds (Assessment, Core and MPM) monitored from January through December 2011. Zone boundaries are also provided for reference.

Figure 8. ESJWQC January through December 2011 monitoring sites relative to zone boundaries

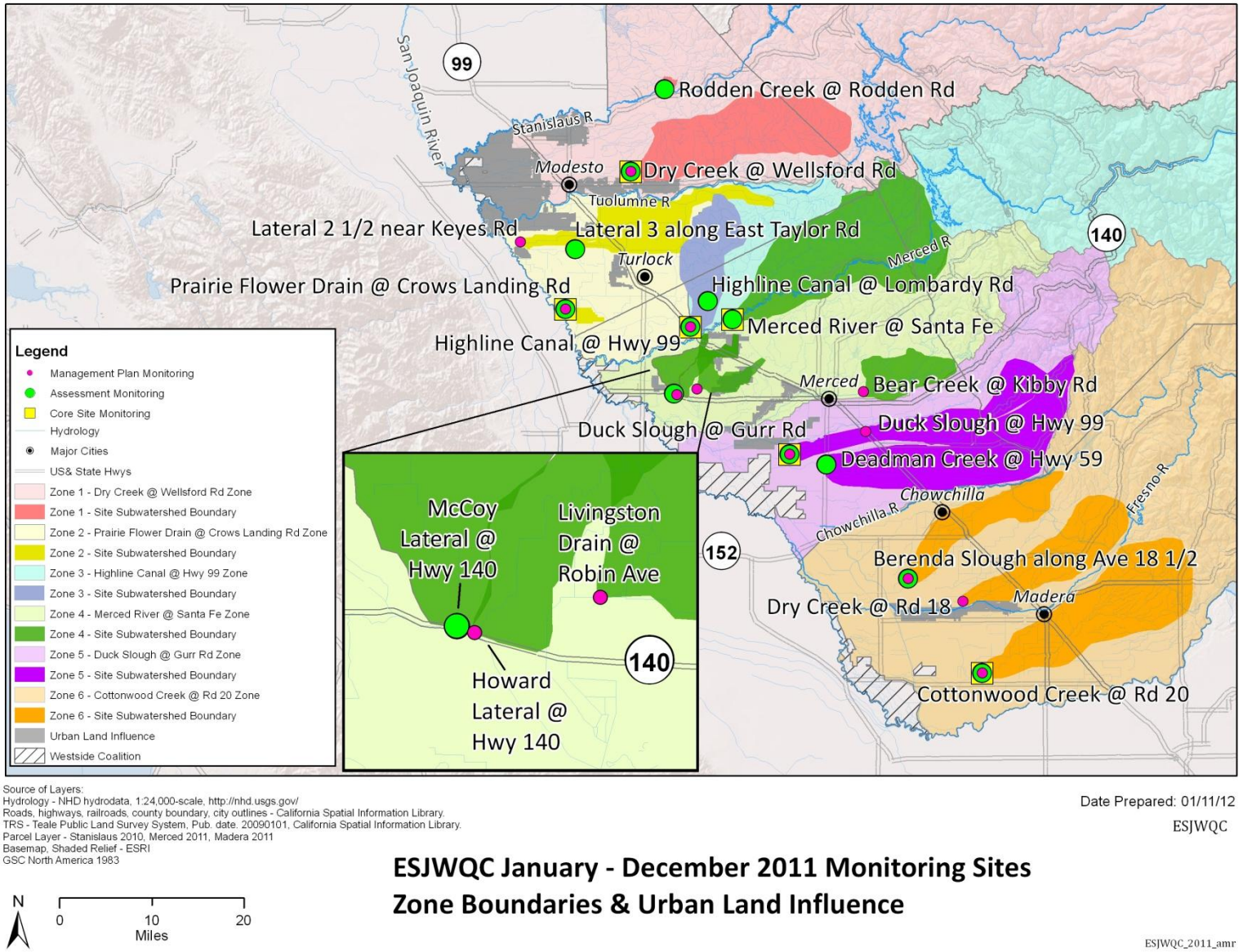


Table 10. ESJWQC sample locations – January through December 2011 (by zone and site name)

ZONE	SITE TYPE[1]	2011 MONITORING	SITE NAME	STATION CODE	LATITUDE	LONGITUDE
1	Core	A, MPM	Dry Creek @ Wellsford Rd	535XDCAWR	37.66000	-120.87526
1	Assessment	A	Rodden Creek @ Rodden Rd	535XRCARD	37.79053	-120.80886
2	Core	A, MPM	Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	37.44187	-121.00331
2	Assessment	MPM	Lateral 2 1/2 near Keyes Rd	535LTHNKR	37.54766	-121.08509
2	Assessment	A	Lateral 3 along East Taylor Rd	535LTAETR	37.5367	-120.9841
3	Core	A, MPM	Highline Canal @ Hwy 99	535XHCHNN	37.41254	-120.75941
3	Assessment	A	Highline Canal @ Lombardy Rd	535XHCALR	37.45547	-120.72181
4	Core	A	Merced River @ Santa Fe	535XMRSFD	37.42705	-120.67353
4	Assessment	A	McCoy Lateral @ Hwy 140	535XMLAHO	37.30968	-120.78771
4	Assessment	MPM	Livingston Drain @ Robin Ave	535XLDARA	37.31693	-120.74229
4	Assessment	MPM	Howard Lateral @ Hwy 140	535XHLAHO	37.30790	-120.78200
4	Assessment	MPM	Bear Creek @ Kibby Rd	535XBCAKR	37.31230	-120.41535
5	Core	A, MPM	Duck Slough @ Gurr Rd	535XDSAGR	37.21408	-120.56126
5	Assessment	A	Deadman Creek @ Hwy 59	535DMCAHF	37.19755	-120.48763
5	Assessment	MPM	Duck Slough @ Hwy 99	535XDSAHN	37.25031	-120.41043
6	Core	A, MPM	Cottonwood Creek @ Rd 20	545XCCART	36.86860	-120.18180
6	Assessment	A, MPM	Berenda Slough along Ave 18 1/2	545XBSAAE	37.01820	-120.32650
6	Assessment	MPM	Dry Creek @ Rd 18	545XDCARE	36.98180	-120.22056

A – Assessment Monitoring
C – Core Monitoring
MPM – Management Plan Monitoring
[1] Site types are either Assessment or Core based on the ESJWQC MRPP (page 33). The type of monitoring conducted at sample locations depends on the rotation schedule outlined in the ESJWQC MRPP (Table 10, pages 52-53) where Core Monitoring locations rotate into Assessment Monitoring locations every third year.

Table 11. ESJWQC land use acreage of site subwatersheds, January through December 2011.

Land uses designated as irrigated/non-irrigated (I/NI), sites listed alphabetically from Bear Creek @ Kibby Rd to Rodden Creek @ Rodden Rd and numbers rounded to nearest whole number.

Land Use	I/NI	Bear Creek @ Kibby Rd	Berenda Slough along Ave 18 1/2	Cottonwood Creek @ Rd 20	Deadman Creek @ Hwy 59	Dry Creek @ Rd 18	Dry Creek @ Wellsford Rd	Duck Slough @ Gurr Rd	Duck Slough @ Hwy 99	Highline Canal @ Hwy 99	Highline Canal @ Lombardy Ave	Howard Lateral @ Hwy 140	Lateral 2 1/2 near Keyes Rd	Livingston drain @ Robin Ave	McCoy Lateral @ Hwy 140	Merced River @ Santa Fe	Prairie Flower Drain @ Crows Landing Rd	Rodden Creek @ Rodden Rd
Citrus	I	48	58	580	7	418				76	76		36			45		
Citrus	NI						7					4	7	4	4			
Deciduous nut and fruit	I	3424	13937	9222	10598	11084	8118	7010	5030	20941	17091	3585	23297	7647	3670	20681		130
Field crop	I	1943	3046	3516	10400	954	4674	4799	1689	7152	6899	440	3854	773	1573	5527	1951	8
Field crop	NI			314												140		
Grain and hay	I	233	1855	837	2425	439	215	603	290	583	583	262	100	484	524	701		
Grain and hay	NI	195	1414	1893	1161	1212	2169	226	219	11	11		24		35	226		38
Idle	I		237	1259	587	512	238	807	264	181	80	130	434	112	251	141		5
Idle	NI															292		
Riparian Vegetation	NI		322	22			704						102					13
Wild vegetation	NI	16142	8979	35881	52589	12569	57835	27490	25561	572	499	357	2325	559	378	87838		761
Water surface	NI	70	272	717	335	264	316	158	93	184	184	6	435	13	34	671	30	32
Pasture	I	1501	1549	954	8714	552	7599	5155	1949	4949	4892	457	2697	298	335	4543	763	167
Pasture	NI				18		1142	53	43	353	353	9	12	106	9	69		0.2
Rice	I						1186	340				25		25	25			
Feedlot, dairy, farmstead	NI	93	1018	559	655	412	1479	728	248	1391	1273	126	1352	316	375	1042	383	11
Truck, nursery, berry	I	636	141	73	3348	119		1699	926	283	107	2212	675	2082	1525	291		
Urban	NI		2191	10307	544	4538	530	406	283	678	423	892	4335	1330	806	3498		42
Golf Course, cemetery, landscape	NI		233	29		280				1	1	38	186	90	42	203		
Vineyard	I		3630	20465	1321	6702	1764			1311	975	206	717	249	2206	3002		
Total acres		**24283**	**38881**	**86630**	**92702**	**40054**	**87976**	**49475**	**36594**	**38667**	**33447**	**8749**	**40587**	**1517**	**11792**	**128911**	**3126**	**1207**
Irrigated acres		**7784**	**24452**	**36906**	**37400**	**20779**	**23794**	**20414**	**10149**	**35476**	**30704**	**7317**	**31810**	**1345**	**10109**	**34931**	**2714**	**311**

* Land use information obtained from data provided by DWR, http://www.landwateruse.water.ca.gov/annualdata/landuse/2001/landuselevels.cfm. Data were compiled in 2001 and land use in some areas of the ESJWQC may have changed since that time.

SITE SUBWATERSHED DESCRIPTIONS

The Coalition sampled 18 site subwatersheds as part of NM and MPM from January through December 2011. Water was not present at all sites during every monitoring event and some sites were not able to be sampled every month. Irrigated acres are included in the site subwatershed descriptions; however, these acreages are subject to change due to updated GIS layers and subwatershed boundary modifications. Maps of land use in each site subwatershed are included in Appendix VIII (Land Use Maps and 2011 Annual Site Photos). A site description of Lateral 3 along East Taylor Road is included in Appendix X; the associated map and site photos are included in Appendix VIII.

- Bear Creek @ Kibby Rd (7,784 irrigated acres) – This site subwatershed drains an eastern portion of the Coalition region in Merced County. Bear Creek originates in the foothills of the Sierras with Burn's Creek as one of the major tributaries. Bear Creek drains to the east just north of the town of Planada, through Merced and eventually to the San Joaquin River. The primary irrigated agriculture in the site subwatershed includes deciduous fruits and nuts, field crops, truck crops, and irrigated pasture.
- Berenda Slough along Ave 18 ½ (24,452 irrigated acres) – This site subwatershed flows from Berenda Reservoir southwest through northern Madera County and is located southwest of the city of Chowchilla. When flows are sufficient, Berenda Slough empties into the Eastside Bypass. However, this waterway does not normally connect with the Bypass due to insufficient flow. The primary agriculture consists of orchards, vineyards, pasture and field crops.
- Cottonwood Creek @ Rd 20 (36,906 irrigated acres) – This site subwatershed is at the very southern edge of the Coalition region in Madera County and drains into the Eastside Bypass. The immediate upstream agriculture is vineyards with deciduous nuts farther to the east. The eastern portion of the subwatershed is dominated by wild vegetation as the subwatershed extends into the foothills.
- Deadman Creek @ Hwy 59 (37,400 irrigated acres) – Deadman Creek flows out of the Sierra foothills and confluences with Dutchman's Creek in the vicinity of Highway 59. The primary agriculture in the site subwatershed includes orchards, irrigated pasture and field crops. A large portion of the subwatershed is wild vegetation.
- Dry Creek @ Rd 18 (20,779 irrigated acres) – This site subwatershed originates in the Sierra foothills and flows just north of the city of Madera eventually draining into the San Joaquin River through various channels and irrigation ditches. The primary irrigated agriculture within the subwatershed is deciduous orchards and vineyards with some scattered field crops.
- Dry Creek @ Wellsford Rd (23,794 irrigated acres) – This site subwatershed is in the northern part of the Coalition region and drains field crops, deciduous nuts, mixed pasture, and vineyards. Dry Creek originates to the east of Modesto, flows through Modesto and eventually confluences with the Tuolumne River. This site subwatershed samples Dry Creek at the furthest downstream location that collects agricultural drainage prior to flowing through Modesto. Dairies are located upstream of this site and the town of Waterford may contribute an urban signal. The

subwatershed extends into the foothills and is dominated in the east by wild vegetation with some rice, row crops and irrigated pasture.

- Duck Slough @ Gurr Rd (20,414 irrigated acres) – This site subwatershed is located downstream from the Duck Slough @ Hwy 99 site subwatershed. Duck Slough originates in the Sierra foothills and flows west (becoming the Duck Slough @ Gurr Rd site subwatershed) eventually joining with Deadman Creek in the western portion of the Coalition region. The slough eventually flows into the San Joaquin River via Deadman Creek and Deep Slough. Located to the southwest of Merced, this site drains field crops immediately upstream and deciduous nuts further upstream as well as some irrigated pasture. Treated wastewater from the city of Madera enters Duck Slough a few miles upstream of the Gurr Rd site.
- Duck Slough @ Hwy 99 (10,149 irrigated acres) – This site subwatershed is located upstream of the Duck Slough @ Gurr Rd site subwatershed and it was selected to determine relative contribution to water quality impairments from the upstream portion of the Duck Slough subwatershed. Duck Slough originates in the Sierra foothills and flows west (becoming the Duck Slough @ Gurr Rd site subwatershed) eventually joining with Deadman Creek in the western portion of the Coalition region. The monitoring site is located just east of Highway 99 and south of Planada and Merced. Irrigated agriculture in this site subwatershed is primarily deciduous nuts with some truck crops, field crops, and irrigated pastureland.
- Highline Canal @ Hwy 99 (35,476 irrigated acres) – The Highline Canal is a conveyance of the Turlock Irrigation District (TID) and carries both clean irrigation water and irrigation return flow during the summer in addition to urban and agricultural storm water runoff during the winter. This site was selected as a downstream companion site to the Highline Canal @ Lombardy Rd site. This site subwatershed is monitored to determine the relative contribution of the upstream and downstream site subwatersheds to water quality impairments. The sampling site is located just south of Delhi as the canal crosses Highway 99. Irrigated agriculture at this location is primarily deciduous nuts. Small amounts of field crops, irrigated pasture, and vineyards are also present.
- Highline Canal @ Lombardy Rd (30,704 irrigated acres) – The Highline Canal is a conveyance of the Turlock Irrigation District (TID) and carries both clean irrigation water and irrigation return flow during the summer, and storm water runoff during the winter. The Highline Canal flows west and eventually drains into the Merced River. The main upstream tributary of the Highline Canal is Mustang Creek which is a major tributary during the dormant season and passes immediately to the southeast of the Turlock Airport. The predominant crop in this site subwatershed is deciduous nuts with some dairies located upstream.
- Howard Lateral @ Hwy 140 (7,317 irrigated acres) – The site subwatershed is located just southwest of Livingston Drain in the central portion of the Coalition region in Merced County and is managed by Merced Irrigation District and flows are intermittent. Water from Hammatt Lateral and Arena Canal drain into Howard Lateral. Arena Canal receives storm water from the city of Livingston as well as water from Livingston Canal. Agricultural land use is predominantly truck/nursery/berry crops and deciduous fruit. Some field crops, pastureland, grains/hay, vineyard and dairy land are also included in the subwatershed.

- Lateral 2 1/2 near Keyes Rd (31,810 Irrigated acres) – This site subwatershed is located in the western portion of the Coalition region just south of the Tuolumne River and east of the San Joaquin River. The site subwatershed extends east past the City of Modesto to Turlock Lake. The primary agriculture in this site subwatershed is deciduous fruits and nuts followed by field crops, irrigated pasture and a few vineyards.
- Livingston Drain @ Robin Ave (11,670 irrigated acres) – This site subwatershed is located in the west central portion of the Coalition region in Merced County and east of Howard Lateral. It is located west of Atwater and Livingston. Water from Hammatt Lateral and Arena Canal drain into Livingston Drain. Arena Canal receives storm water from the city of Livingston as well as water from Livingston Canal. The agriculture is almost entirely orchards with some truck crops. Several dairies are also present in the watershed.
- McCoy Lateral @ Hwy 140 (10,109 irrigated acres) – This site subwatershed is located immediately west of Howard Lateral. Water from Hammatt Lateral and Arena Canal drain into McCoy Lateral. Arena Canal receives storm water from the city of Livingston as well as water from Livingston Canal. The agriculture is a mixture of deciduous fruits and nuts, vineyards, field crops, truck/nursery and berries.
- Merced River @ Santa Fe (34,931 irrigated acres) – This site subwatershed is designated as a major waterbody and is 303d listed. It was selected as an integrator site for several of the drains and tributaries in the vicinity. The Merced River originates in the high Sierra encountering several dams and impoundments as it flows west eventually draining into the San Joaquin River near Hatfield State Park. Upstream agriculture in the immediate vicinity of the river includes some field crops and deciduous nuts (primarily almonds). Irrigated pasture and vineyards are also present within the subwatershed.
- Prairie Flower Drain @ Crows Landing Rd (2,714 irrigated acres) – Relative to other drains in the western portion of the Coalition region, Prairie Flower Drain is longer and drains mostly irrigated agriculture. Dairies and feedlots are common in this part of the Coalition region and this drain receives runoff from farmland managed by dairies immediately upstream. Agriculture in the upstream vicinity is field crops and pasture. The water table in this site subwatershed is very shallow and the groundwater is high in salinity; as Prairie Flower Drain intercepts this groundwater supply it moves it to Harding Drain.
- Rodden Creek @ Rodden Rd (311 irrigated acres) – Rodden Creek, fed by Rodden Lake, is located in the northern portion of Stanislaus County and drains into the Stanislaus River. It is a small subwatershed dominated with wild vegetation but includes deciduous nut trees (mostly walnuts), irrigated and non irrigated pasture and a few row crops. There is a small group of houses (urban area) to the east of the sampling location along Rodden Road.

RAINFALL RECORDS

The ESJWQC considers a sampling event a "storm sampling event" when there is at least 0.25 inches of rain recorded in the Coalition region within a 24 hour period. Monthly sampling is pre-scheduled; therefore if a storm is forecasted within a week before a scheduled sampling event or predicted within two days after the scheduled sampling event, the Coalition moves its sampling date to capture the storm. The Coalition sampled one storm from January through December 2011. Below is a description of all the storms that occurred during the 2011 monitoring year, including whether or not they were sampled (further described in the Monitoring Results and Sample Details section of this report).

Daily rainfall records are provided for the three major cities in the Coalition region: Modesto, Merced, and Madera (Figure 9, January – March 2011; Figure 10, April – June 2011 and Figure 11, October – December 2011).

January through March 2011

One storm event was monitored from January through March 2011.

The first storm event of 2011 lasted from January 1 through January 2. During this period, 1.3 inches of precipitation was reported in Merced, 0.83 inches in Modesto and 0.06 inches in Madera. This storm did not meet the trigger limit in all three cities, rain amounts were not consistent across the region, and the storm was difficult to predict. In addition, this was the first storm of the season following multiple months of dry weather. The rain event was not sampled. Several smaller storms brought precipitation to the region on January 11, 13, 14, 22, 23, and 27; none of these storms resulted in more than a quarter inch of precipitation. Another storm system was recorded in the Valley on January 30, 2011, depositing 0.29 inches of rain in Merced, 0.12 inches in Modesto, and 0.25 inches in Madera (Figure 9). The precipitation trigger limit was not reached in Modesto and sampling had already occurred on January 18; therefore, sampling was not rescheduled to capture this event.

On February 14, 2011 light showers occurred, but the trigger limit was not met as less than a tenth of an inch of rain was recorded in Merced, Modesto, and Madera. On February 16, 2011, a larger storm system occurred and remained in the area until February 20, 2011. By the time the system subsided, Merced had received 0.87 inches of precipitation, Modesto reported 1.36 inches, and Madera reported 0.97 inches over a four day period. The first day of the storm (February 16) Merced received 0.3 inches of rain, Modesto recorded 0.33 inches and Madera recorded 0.28 inches. Storm sampling was initiated the following day on February 17, 2011. Another substantial system was recorded on February 25-26, with 0.7 inches of precipitation in Merced, 0.44 inches in Modesto, and 0.64 inches in Madera (Figure 9). Although the trigger limit was met, the Coalition does not have the resources available to sample more than once in a single month. In addition, the chances of additional applications having had taken place since the last storm event were very low.

Figure 9 indicates the first half of March included a few small rain events that accumulated less than 0.2 inches of precipitation. Sampling occurred on March 15, 2011 without any heavy precipitation predicted. On March 18, 2011 an unpredicted storm system settled over the Valley and continued until March 26, 2011. During these nine days Merced received 3.87 inches of precipitation, Modesto reported 2.76 inches, and Madera reported 3.23 inches of precipitation. While this storm had significant rainfall totals the Coalition does not have the resources available to sample twice within a single month. If the storm had been predicted, the Coalition would have moved the March sampling date to the following week to capture any runoff as a result of the storm.

April through June 2011

No storm events were monitored in April through June 2011.

April was unseasonably dry for the East San Joaquin region with only two days of measurable precipitation. Between April 7 and 8, 2011 Merced and Madera both reported 0.19 inches of precipitation, while Modesto reported 0.03 inches (Figure 10).

Due to the number of sample sites that required monitoring during the irrigation season, May was the first month the Coalition split its monthly monitoring schedule (normally all sites are monitored in one day) into two days (once a week during two consecutive weeks). A storm on May 15, 2011 produced 0.39 inches of precipitation in Merced, 0.35 inches in Modesto, and 0.24 inches in Madera (Figure 10). This was a substantial amount of precipitation for the middle of May and it occurred two days before the scheduled sampling of the southern half of the ESJWQC region. The rest of the month did not receive any recorded rainfall greater than the 0.25 trigger limit.

Early June received four days of precipitation from June 4 through June 7, 2011, at which time Merced reported 0.47 inches of precipitation, Modesto reported 0.81 inches, and Madera measured 0.54 inches. June 4, 2011 received the highest totals of the event with 0.45 inches in Merced, 0.53 inches in Modesto, and 0.49 inches in Madera (Figure 10). Another small storm system was reported on June 29, 2011, however all three cites recorded less than two tenths of an inch of precipitation. Sites were monitored as scheduled during the June irrigation event on June 14 and June 2.

July through September 2011

No storm events were monitored July through September 2011.

From July through September, the area within the ESJWQC region was hot and dry with no precipitation. Therefore there is no graph of precipitation associated with this quarter.

October through December 2011

No storm events were monitored from October through December 2011.

October received four days of measurable precipitation; the highest amount of rainfall was on October 5, 2011 when Merced reported 0.76 inches of precipitation, Modesto reported 0.65 inches and Madera reported 0.74 inches (Figure 11). The October storm was a large system for this time of the year and was larger than predicted. Since the region had not received any precipitation since June 29, 2011 and irrigation season was completed by this point, the rainfall resulted in very little runoff. The Coalition conducted scheduled monitoring on October 11, 2011.

During November there were nine days with recorded rainfall. The first storm system lasted three days, from November 4 through November 6, 2011, and had totals that were above 0.25 inches over a three day period in Merced and Madera (0.36 inches and 0.31 inches, respectively). Modesto received only 0.10 inches of precipitation over the three day period; none of the three cities had precipitation greater than 0.25 inches in 24 hours (Figure 11). This storm was initially predicted as a shower and the rain that occurred was not evenly distributed over the Coalition area. The second storm system of the month that was close to meeting the trigger limit occurred on November 20, 2011. Merced received 0.25 inches of precipitation, Madera received 0.4 inches, and 0.22 inches were recorded in Modesto. Scheduled monitoring occurred on November 8, 2011.

December had three days with measurable rainfall, all of which were less than 0.25 inches. Measurable rain occurred on December 15 in all three cities; Modesto received 0.16 inches of precipitation, Madera received 0.11 inches and Merced recorded 0.06 inches. On December 20 and 21 only 0.01 inches of rainfall was recorded in Merced (Figure 11). The month of December was very dry and monthly sampling took place as scheduled on December 6, 2011.

Figure 9. Precipitation history for Modesto, Merced and Madera, January through March 2011.

The shaded gray area represents the trigger to initiate sampling: 0.25”- 0.5” rain in 24 hours. All data reported on weatherunderground.com.

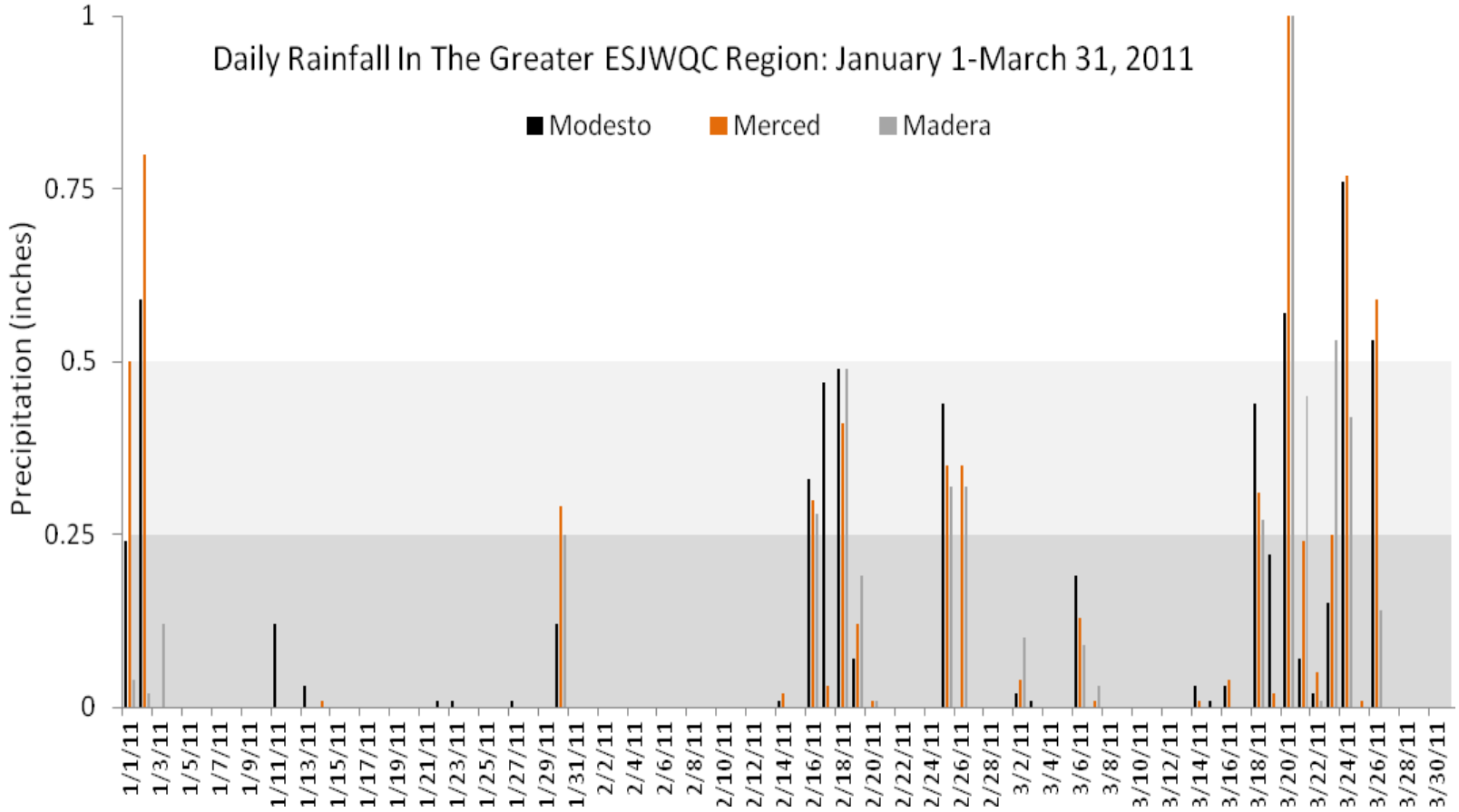


Figure 10. Precipitation history for Modesto, Merced and Madera, April through June 2011.

The shaded gray area represents the trigger to initiate sampling: 0.25” - 0.5” rain in 24 hours. All data reported on weatherunderground.com.

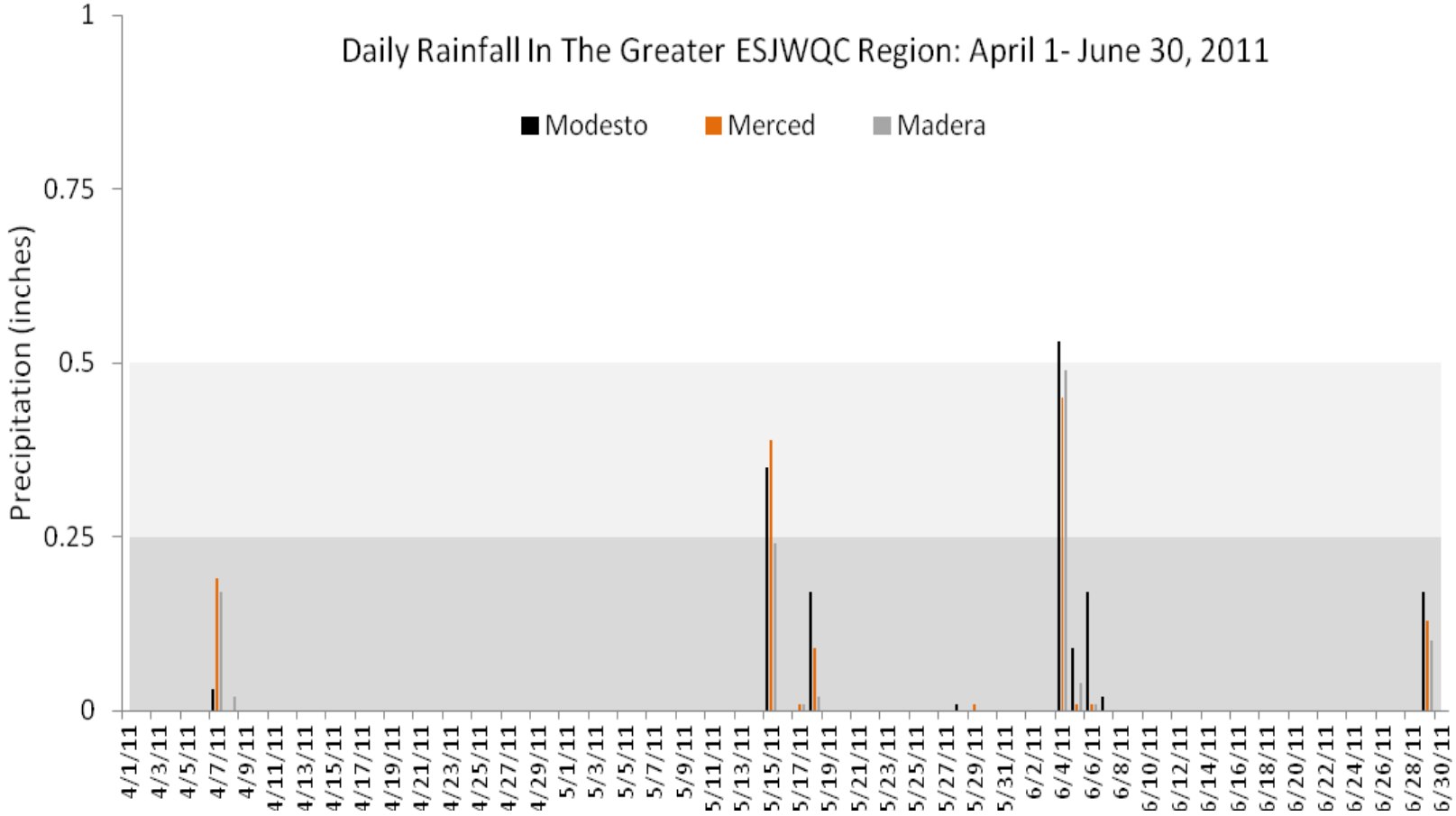
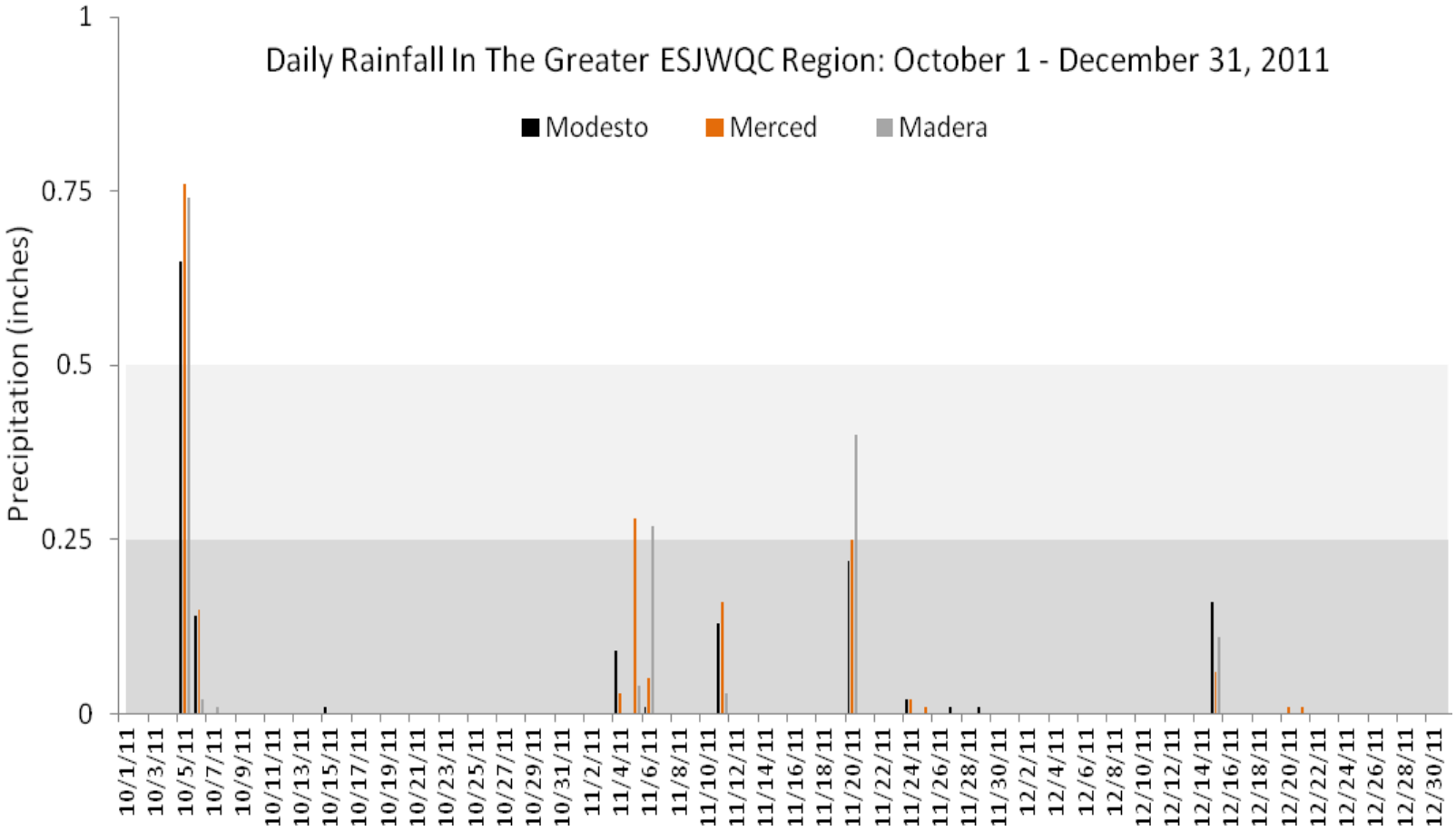


Figure 11. Precipitation history for Modesto, Merced and Madera, October through December 2011.

The shaded gray area represents the trigger to initiate sampling: 0.25" - 0.5" rain in 24 hours. All data reported on weatherunderground.com.



MONITORING RESULTS AND SAMPLE DETAILS

Monitoring occurred at sites in the ESJWQC from January through December 2011 (Table 12). Original Chain of Custody (COC) forms associated with samples collected for analysis were scanned and converted to pdf files for submission with this report (Appendix I). Chain of Custody forms were faxed by the laboratories to Michael L. Johnson, LLC (MLJ-LLC) after the receipt of samples by the laboratory. As such, they are complete and accurate records of sample handling and processing and reflect the timing of sample collection and delivery to the laboratories. Sample collection and delivery was performed according to the amended ESJWQC Quality Assurance Project Plan (QAPP; page 33) approved on February 23, 2011. If there were any discrepancies between the COC and sample delivery, the issues were resolved and documented either directly on the COC or on an anomaly form filled out by the laboratory. Documentation of COC anomalies can be found on page 2 in Appendix I. There was one instance of sample delivery failure during ESJWQC 2011 monitoring; samples collected during the February 17, 2011 sampling event for glyphosate and paraquat analysis were lost by the courier. Notification from the laboratory of the missing samples was not received until March 25, 2011 and the samples could not be re-collected.

Instantaneous loads are calculated for all detections (Appendix II, Table II-7) according to the following formula:

Instantaneous Load (µg/sec) = Discharge (cfs) X 28.317L x Concentration (milligram/L x 1,000 or µg/L).

The load values calculated for pesticides or other constituents represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide the Regional Water Board with a context for the concentrations of various constituents at the time that samples were collected. Instantaneous load calculation for Total Maximum Daily Load (TMDL) compliance will be included in the MPUR to be submitted on April 1, 2012.

Complete monitoring results from sampling that occurred from January through December 2011 are included in Appendix II and III. Results are provided for field parameters, organics (pesticides), inorganic constituents including metals and *E. coli*, toxicity (water and sediment), sediment chemistry, and loads for any detectable analyte with corresponding flow data from the site. Monitoring data include results from samples taken for NM, MPM and sediment monitoring events. Each sampling location, sampling date, sampling time and type of monitoring are listed in Table 12 and all field data sheets can be found in Appendix IX with the exception of data collected from Lateral 3 along East Taylor Rd. Appendix X includes monitoring data collected during 2011 from Lateral 3 along East Taylor Rd. All laboratory reports including electronic Level III data packages for 2011 are submitted with this report.

Table 12. Sample details for January through December 2011 (by station name, sample date and monitoring event)

Season/Group codes are explained at the bottom of the table.

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Bear Creek @ Kibby Rd	535XBCAKR	MPM	Winter1, Management Plan Monitoring	01/18/11	17:40	None	January MPM for copper; Too deep to measure discharge.
Bear Creek @ Kibby Rd	535XBCAKR	MPM	Storm1, Management Plan Monitoring	02/17/11	17:50	None	February MPM for copper; Too deep to measure discharge.
Bear Creek @ Kibby Rd	535XBCAKR	MPM	Irrigation2, Management Plan Monitoring	05/17/11	09:00	None	May MPM for chlorpyrifos and *C. dubia* toxicity; Too deep to measure discharge.
Bear Creek @ Kibby Rd	535XBCAKR	MPM	Irrigation4, Management Plan Monitoring	07/19/11	14:00	None	July Management Plan Monitoring for *C. dubia* toxicity and chlorpyrifos; Too deep to measure discharge.
Bear Creek @ Kibby Rd	535XBCAKR	MPM	Irrigation5, Management Plan Monitoring	08/16/11	13:20	None	August MPM for copper; Metals samples were filtered at the end of the day at 15:00, due to a sampling pump malfunction.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Winter1	01/18/11	14:10	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Storm1, High TSS 1-M, High TSS 1-P	02/17/11	14:10	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Winter2	03/15/11	13:40	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	Sediment	Winter2	03/17/11	10:20	None	Discharge not measured due to sediment toxicity monitoring only.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Irrigation1	04/19/11	14:20	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	MPM, NM	Irrigation2, Management Plan Monitoring	05/17/11	14:30	None	May MPM for *S. capricornutum* toxicity; Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Irrigation3	06/21/11	12:10	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	MPM, NM	High TSS 1-M , Irrigation4, Management Plan Monitoring	07/19/11	12:40	None	July MPM for *S. capricornutum* toxicity and chlorpyrifos; Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	High TSS 1-P, High TSS 2-M, Irrigation5	08/16/11	12:40	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	MPM, NM, Sediment	Irrigation6, Management Plan Monitoring	09/13/11	12:20	None	September MPM for chlorpyrifos; Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Fall1	10/11/11	11:30	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Fall2	11/08/11	11:00	None	Too deep to measure discharge.
Berenda Slough along Ave 18 1/2	545XBSAAE	NM	Fall3	12/06/11	11:00	None	Discharge recorded as zero due to no measurable flow.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM	Winter1, Management Plan Monitoring	01/18/11	15:50	None	January MPM for copper, diuron, and chlorpyrifos.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM	Storm1, Management Plan Monitoring, High TSS 1-M, High TSS 1-P	02/17/11	16:30	None	February MPM for copper, diuron, chlorpyrifos, and diazinon.

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Cottonwood Creek @ Rd 20	545XCCART	NM	Winter2	03/15/11	15:20	None	
Cottonwood Creek @ Rd 20	545XCCART	Sediment	Winter2	03/17/11	09:10	None	Discharge not measured due to sediment toxicity monitoring only.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM	Irrigation1, Management Plan Monitoring	04/19/11	11:10	None	April MPM for copper.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM	Irrigation2, Management Plan Monitoring	05/17/11	11:10	None	May MPM for copper; Too deep to measure discharge.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM	Irrigation3, Management Plan Monitoring	06/21/11	10:00	None	June MPM for copper; Too deep to measure discharge.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM	High TSS 1-M , Irrigation4, Management Plan Monitoring	07/19/11	10:30	None	July MPM for copper; Too deep to measure discharge.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM	High TSS 1-P, High TSS 2-M, Irrigation5, Management Plan Monitoring	08/16/11	10:00	None	August MPM for copper; Too deep to measure discharge.
Cottonwood Creek @ Rd 20	545XCCART	MPM, NM, Sediment	Irrigation6	09/13/11	09:40	None	September MPM for copper.
Cottonwood Creek @ Rd 20	545XCCART	NM	Fall1	10/11/11	10:30	None	
Cottonwood Creek @ Rd 20	545XCCART	NM	Fall2	11/08/11	09:00	Dry	
Cottonwood Creek @ Rd 20	545XCCART	NM	Fall3	12/06/11	09:13	Dry	
Deadman Creek @ Hwy 59	535DMCAHF	NM	Winter1	01/18/11	12:30	None	
Deadman Creek @ Hwy 59	535DMCAHF	NM	Storm1, High TSS 1-M, High TSS 1-P	02/17/11	12:50	None	Discharge recorded as zero due to no measurable flow.
Deadman Creek @ Hwy 59	535DMCAHF	NM	Winter2	03/15/11	12:00	None	
Deadman Creek @ Hwy 59	535DMCAHF	Sediment	Winter2	03/17/11	11:10	None	Discharge not measured due to sediment toxicity monitoring only.
Deadman Creek @ Hwy 59	535DMCAHF	NM	Irrigation1	04/19/11	16:00	None	
Deadman Creek @ Hwy 59	535DMCAHF	NM	Irrigation2	05/17/11	10:10	None	Discharge recorded as zero due to no measurable flow.
Deadman Creek @ Hwy 59	535DMCAHF	NM	Irrigation3	06/21/11	11:50	None	
Deadman Creek @ Hwy 59	535DMCAHF	NM	High TSS 1-M , Irrigation4	07/19/11	12:20	None	
Deadman Creek @ Hwy 59	535DMCAHF	NM	High TSS 1-P, High TSS 2-M, Irrigation5	08/16/11	11:30	None	Metals samples were filtered at the end of the day at 15:00, due to a sampling pump malfunction.
Deadman Creek @ Hwy 59	535DMCAHF	NM, Sediment	Irrigation6	09/13/11	13:30	None	
Deadman Creek @ Hwy 59	535DMCAHF	NM	Fall1	10/11/11	12:40	None	
Deadman Creek @ Hwy 59	535DMCAHF	NM	Fall2	11/08/11	12:30	None	

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Deadman Creek @ Hwy 59	535DMCAHF	NM	Fall3	12/06/11	12:20	None	
Dry Creek @ Rd 18	545XDCARE	NM	Winter1, Management Plan Monitoring	01/18/11	15:10	None	January MPM for copper, diuron, and *S. capricornutum* toxicity.
Dry Creek @ Rd 18	545XDCARE	NM	Storm1, Management Plan Monitoring	02/17/11	15:20	None	February MPM for copper, diuron, chlorpyrifos, diazinon, and *S. capricornutum* toxicity.
Dry Creek @ Rd 18	545XDCARE	MPM	Winter2, Management Plan Monitoring	03/17/11	09:50	None	March MPM for *H. azteca* toxicity; Discharge not measured due to sediment toxicity monitoring only.
Dry Creek @ Rd 18	545XDCARE	MPM	Irrigation1, Management Plan Monitoring	04/19/11	13:20	None	April MPM for copper and chlorpyrifos.
Dry Creek @ Rd 18	545XDCARE	MPM	Irrigation2, Management Plan Monitoring	05/17/11	13:20	None	May MPM for copper, lead, and *S. capricornutum* toxicity.
Dry Creek @ Rd 18	545XDCARE	MPM	Irrigation3, Management Plan Monitoring	06/21/11	11:20	None	June MPM for copper and lead.
Dry Creek @ Rd 18	545XDCARE	MPM	Irrigation4, Management Plan Monitoring	07/19/11	11:40	None	July MPM for copper and chlorpyrifos.
Dry Creek @ Rd 18	545XDCARE	MPM	Irrigation5, Management Plan Monitoring	08/16/11	11:40	None	August MPM for copper and lead.
Dry Creek @ Rd 18	545XDCARE	MPM	Irrigation6, Management Plan Monitoring	09/13/11	11:10	None	September Management Plan Monitoring for *H. azteca* sediment toxicity, copper, and lead.
Dry Creek @ Wellsford Rd	535XDCAWR	NM	Winter1	01/18/11	10:50	None	
Dry Creek @ Wellsford Rd	535XDCAWR	MPM, NM	Storm1, Management Plan Monitoring, High TSS 1-M, High TSS 1-P	02/17/11	11:00	None	February MPM for copper, diuron, and *S. capricornutum* toxicity.
Dry Creek @ Wellsford Rd	535XDCAWR	MPM, NM	Winter2, Management Plan Monitoring	03/15/11	10:00	None	March MPM for *S. capricornutum* toxicity.
Dry Creek @ Wellsford Rd	535XDCAWR	MPM	Winter2, Management Plan Monitoring	03/17/11	17:40	None	March MPM for *H. azteca* toxicity; Discharge not measured due to sediment toxicity monitoring only.
Dry Creek @ Wellsford Rd	535XDCAWR	MPM, NM	Irrigation1, Management Plan Monitoring	04/19/11	10:00	None	April MPM for copper.
Dry Creek @ Wellsford Rd	535XDCAWR	NM	Irrigation2	05/10/11	10:40	None	
Dry Creek @ Wellsford Rd	535XDCAWR	NM	Irrigation3	06/14/11	08:40	None	
Dry Creek @ Wellsford Rd	535XDCAWR	NM	Irrigation3	06/15/11	12:40	None	June sampling for *P. promelas* toxicity. Original samples were collected on 6/14/11, but due to laboratory error new samples needed to be collected on 6/15/11; Discharge not measured due to toxicity monitoring only.
Dry Creek @ Wellsford Rd	535XDCAWR	MPM, NM	High TSS 1-M , Irrigation4, Management Plan Monitoring	07/12/11	09:50	None	July MPM for chlorpyrifos.

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Dry Creek @ Wellsford Rd	535XDCAWR	MPM, NM	High TSS 1-P, High TSS 2-M, Irrigation5, Management Plan Monitoring	08/09/11	08:20	None	August MPM for chlorpyrifos.
Dry Creek @ Wellsford Rd	535XDCAWR	MPM, NM	Irrigation6, Management Plan Monitoring	09/06/11	10:30	None	September MPM for *H. azteca* sediment toxicity and chlorpyrifos.
Dry Creek @ Wellsford Rd	535XDCAWR	NM	Fall1	10/11/11	11:10	None	
Dry Creek @ Wellsford Rd	535XDCAWR	NM	Fall2	11/08/11	09:40	None	
Dry Creek @ Wellsford Rd	535XDCAWR	NM	Fall3	12/06/11	09:50	None	
Duck Slough @ Gurr Rd	535XDSAGR	MPM, NM	Winter1, Management Plan Monitoring	01/18/11	11:30	None	January MPM for copper.
Duck Slough @ Gurr Rd	535XDSAGR	MPM, NM	Storm1, Management Plan Monitoring, High TSS 1-M, High TSS 1-P	02/17/11	10:30	None	February MPM for copper and *C. dubia* toxicity.
Duck Slough @ Gurr Rd	535XDSAGR	MPM, NM	Winter2, Management Plan Monitoring	03/15/11	10:20	None	March MPM for *C. dubia* toxicity.
Duck Slough @ Gurr Rd	535XDSAGR	Sediment	Winter2	03/17/11	11:40	None	Discharge not measured due to sediment toxicity monitoring only.
Duck Slough @ Gurr Rd	535XDSAGR	NM	Irrigation1	04/19/11	17:20	None	Too deep to measure discharge.
Duck Slough @ Gurr Rd	535XDSAGR	MPM, NM	Irrigation2, Management Plan Monitoring	05/17/11	11:10	None	May MPM for copper; Too deep to measure discharge.
Duck Slough @ Gurr Rd	535XDSAGR	MPM, NM	Irrigation3, Management Plan Monitoring	06/21/11	10:50	None	June MPM for copper.
Duck Slough @ Gurr Rd	535XDSAGR	MPM, NM	High TSS 1-M , Irrigation4, Management Plan Monitoring	07/19/11	11:20	None	July MPM for *S. capricornutum* toxicity, copper, and chlorpyrifos.
Duck Slough @ Gurr Rd	535XDSAGR	NM	High TSS 1-P, High TSS 2-M, Irrigation5	08/16/11	10:40	None	Metals samples were filtered at the end of the day at 15:00, due to a sampling pump malfunction; Too swift to measure discharge.
Duck Slough @ Gurr Rd	535XDSAGR	MPM, NM	Irrigation6, Management Plan Monitoring	09/13/11	12:20	None	September MPM for *S. capricornutum* toxicity and *H. azteca* sediment toxicity.
Duck Slough @ Gurr Rd	535XDSAGR	NM	Fall1	10/11/11	13:30	None	
Duck Slough @ Gurr Rd	535XDSAGR	NM	Fall2	11/08/11	13:00	None	
Duck Slough @ Gurr Rd	535XDSAGR	NM	Fall3	12/06/11	13:00	Dry	
Duck Slough @ Hwy 99	535XDSAHN	MPM	Storm1, Management Plan Monitoring	02/17/11	18:10	None	February MPM for copper; Too deep to measure discharge.
Duck Slough @ Hwy 99	535XDSAHN	MPM	Irrigation1, Management Plan Monitoring	04/19/11	09:00	None	April MPM for copper, lead, and *S. capricornutum* toxicity; Too deep to measure discharge.

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Duck Slough @ Hwy 99	535XDSAHN	MPM	Irrigation2, Management Plan Monitoring	05/17/11	08:50	None	May MPM for chlorpyrifos and lead.
Duck Slough @ Hwy 99	535XDSAHN	MPM	Irrigation3, Management Plan Monitoring	06/21/11	12:40	None	June MPM for copper and lead; Too deep to measure discharge.
Duck Slough @ Hwy 99	535XDSAHN	MPM	Irrigation4, Management Plan Monitoring	07/19/11	13:40	None	July MPM for *S. capricornutum* toxicity, copper, lead, and chlorpyrifos; Too deep to measure discharge.
Duck Slough @ Hwy 99	535XDSAHN	MPM	Irrigation5, Management Plan Monitoring	08/16/11	12:40	None	August MPM for copper and lead; Metals samples were filtered at the end of the day at 15:00, due to a sampling pump malfunction; Too deep to measure discharge.
Duck Slough @ Hwy 99	535XDSAHN	MPM	Irrigation6, Management Plan Monitoring	09/13/11	13:50	None	September MPM for copper, lead, and chlorpyrifos; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	Winter1, Management Plan Monitoring	01/18/11	17:00	Dry	January MPM for copper, diuron, and chlorpyrifos.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	Storm1, Management Plan Monitoring, High TSS 1-M, High TSS 1-P	02/17/11	14:37	Dry	February MPM for copper, chlorpyrifos, diuron, and *S. capricornutum* toxicity.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	Winter2, Management Plan Monitoring	03/15/11	14:50	None	March MPM for *C. dubia* and *S. capricornutum* toxicity; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	MPM	Winter2, Management Plan Monitoring	03/17/11	15:10	None	March MPM for *H. azteca* toxicity; Discharge not measured due to sediment toxicity monitoring only.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	Irrigation1, Management Plan Monitoring	04/19/11	16:50	None	April MPM for copper and *S. capricornutum* toxicity; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	Irrigation2, Management Plan Monitoring	05/10/11	15:00	None	May MPM for *C. dubia* and *S. capricornutum* toxicity; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	Irrigation3, Management Plan Monitoring	06/14/11	12:00	None	June MPM for copper; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	NM	Irrigation3	06/15/11	14:40	None	June sampling for *P. promelas* toxicity. Original samples were collected on 6/14/11, but due to laboratory error new samples needed to be collected on 6/15/11; Discharge not measured due to toxicity monitoring only.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	High TSS 1-M , Irrigation4, Management Plan Monitoring	07/12/11	11:00	None	July MPM for copper and chlorpyrifos; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	High TSS 1-P, High TSS 2-M, Irrigation5, Management Plan Monitoring	08/09/11	12:00	None	August MPM for copper; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	MPM, NM	Irrigation6, Management Plan Monitoring	09/06/11	12:00	None	September MPM for *C. dubia* toxicity and *H. azteca* sediment toxicity; Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	NM	Fall1	10/11/11	16:30	None	Too deep to measure discharge.
Highline Canal @ Hwy 99	535XHCHNN	NM	Fall2	11/08/11	14:10	None	
Highline Canal @ Hwy 99	535XHCHNN	NM	Fall3	12/06/11	12:58	Dry	

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Highline Canal @ Lombardy Rd	535XHCALR	NM	Winter1	01/18/11	14:40	None	
Highline Canal @ Lombardy Rd	535XHCALR	NM	Storm1, High TSS 1-M, High TSS 1-P	02/17/11	15:10	None	Discharge recorded as zero due to no measurable flow.
Highline Canal @ Lombardy Rd	535XHCALR	NM	Winter2	03/15/11	15:40	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	Sediment	Winter2	03/17/11	14:00	None	Discharge not measured due to sediment toxicity monitoring only.
Highline Canal @ Lombardy Rd	535XHCALR	NM	Irrigation1	04/19/11	14:40	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	NM	Irrigation2	05/10/11	12:30	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	NM	Irrigation3	06/14/11	10:10	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	NM	Irrigation3	06/15/11	13:50	None	June sampling for *P. promelas* toxicity. Original samples were collected on 6/14/11, but due to laboratory error new samples needed to be collected on 6/15/11; Discharge not measured due to toxicity monitoring only.
Highline Canal @ Lombardy Rd	535XHCALR	NM	High TSS 1-M , Irrigation4	07/12/11	11:50	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	NM	High TSS 1-P, High TSS 2-M, Irrigation5	08/09/11	10:00	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	NM, Sediment	Irrigation6	09/06/11	13:20	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	NM	Fall1	10/11/11	17:00	None	Too deep to measure discharge.
Highline Canal @ Lombardy Rd	535XHCALR	NM	Fall2	11/08/11	15:20	None	
Highline Canal @ Lombardy Rd	535XHCALR	NM	Fall3	12/06/11	13:11	Dry	
Howard Lateral @ Hwy 140	535XHLAHO	MPM	Irrigation1, Management Plan Monitoring	04/19/11	18:00	None	April MPM for copper.
Howard Lateral @ Hwy 140	535XHLAHO	MPM	Irrigation3, Management Plan Monitoring	06/21/11	09:20	None	June MPM for chlorpyrifos.
Howard Lateral @ Hwy 140	535XHLAHO	MPM	Irrigation4, Management Plan Monitoring	07/19/11	09:30	None	July MPM for copper.
Howard Lateral @ Hwy 140	535XHLAHO	MPM	Fall1, Management Plan Monitoring	10/11/11	15:20	None	October MPM for copper.
Lateral 2 1/2 near Keyes Rd	535LTHNKR	MPM	Irrigation1, Management Plan Monitoring	04/19/11	12:20	None	April MPM for chlorpyrifos.
Lateral 2 1/2 near Keyes Rd	535LTHNKR	MPM	Irrigation4, Management Plan Monitoring	07/12/11	09:00	None	July MPM for chlorpyrifos.
Livingston Drain @ Robin Ave	535XLDARA	MPM	Winter1, Management Plan Monitoring	01/18/11	11:00	Dry	January MPM for copper, lead, and chlorpyrifos.
Livingston Drain @ Robin Ave	535XLDARA	MPM	Storm1, Management Plan Monitoring	02/17/11	09:00	Dry	February MPM for copper, lead, and *S. capricornutum* toxicity.

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Livingston Drain @ Robin Ave	535XLDARA	MPM	Irrigation1, Management Plan Monitoring	04/19/11	17:40	None	April MPM for *S. capricornutum* toxicity; Discharge not measured due to toxicity monitoring only.
Livingston Drain @ Robin Ave	535XLDARA	MPM	Irrigation2, Management Plan Monitoring	05/17/11	13:10	None	May MPM for copper and *S. capricornutum* toxicity.
Livingston Drain @ Robin Ave	535XLDARA	MPM	Irrigation3, Management Plan Monitoring	06/21/11	09:50	None	June MPM for copper and chlorpyrifos.
Livingston Drain @ Robin Ave	535XLDARA	MPM	Irrigation4, Management Plan Monitoring	07/19/11	10:20	None	July MPM for copper and chlorpyrifos.
Livingston Drain @ Robin Ave	535XLDARA	MPM	Irrigation5, Management Plan Monitoring	08/16/11	09:50	None	August MPM for chlorpyrifos.
Livingston Drain @ Robin Ave	535XLDARA	MPM	Irrigation6, Management Plan Monitoring	09/13/11	11:10	None	September MPM for copper.
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Winter1	01/18/11	10:00	None	
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Storm1, High TSS 1-M, High TSS 1-P	02/17/11	08:45	Dry	
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Winter2	03/15/11	08:43	Dry	
McCoy Lateral @ Hwy 140	535XMLAHO	Sediment	Winter2	03/17/11	12:40	None	Discharge not measured due to sediment toxicity monitoring only.
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Irrigation1	04/19/11	18:20	None	
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Irrigation2	05/17/11	12:20	None	Discharge recorded as zero due to no measurable flow.
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Irrigation3	06/21/11	08:40	None	Discharge recorded as zero due to no measurable flow.
McCoy Lateral @ Hwy 140	535XMLAHO	NM	High TSS 1-M , Irrigation4	07/19/11	08:50	None	The 2 liter plastic jug for Turbidity, TDS, TSS, and soluble orthophosphate leaked after initial sample collection; A new 2 liter Jug was filled with sample water from a 1 gallon toxicity bottle and was submitted for analyses.
McCoy Lateral @ Hwy 140	535XMLAHO	NM	High TSS 1-P, High TSS 2-M, Irrigation5	08/16/11	08:50	None	Metals samples were filtered at the end of the day at 15:00, due to a sampling pump malfunction.
McCoy Lateral @ Hwy 140	535XMLAHO	NM, Sediment	Irrigation6	09/13/11	09:30	None	Discharge recorded as zero due to no measurable flow.
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Fall1	10/11/11	14:40	None	
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Fall2	11/08/11	14:10	None	Discharge recorded as zero due to no measurable flow.
McCoy Lateral @ Hwy 140	535XMLAHO	NM	Fall3	12/06/11	13:30	Dry	
Merced River @ Santa Fe	535XMRSFD	NM	Winter1	01/18/11	16:00	None	
Merced River @ Santa Fe	535XMRSFD	NM	Storm1, High TSS 1-M, High TSS 1-P	02/17/11	16:20	None	
Merced River @ Santa Fe	535XMRSFD	NM	Winter2	03/15/11	16:30	None	

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Merced River @ Santa Fe	535XMRSFD	Sediment	Winter2	03/17/11	13:30	None	Discharge not measured due to sediment toxicity monitoring only.
Merced River @ Santa Fe	535XMRSFD	NM	Irrigation1	04/19/11	15:40	None	
Merced River @ Santa Fe	535XMRSFD	NM	Irrigation2	05/10/11	13:30	None	
Merced River @ Santa Fe	535XMRSFD	NM	Irrigation3	06/14/11	10:50	None	
Merced River @ Santa Fe	535XMRSFD	NM	Irrigation3	06/15/11	14:10	None	June sampling for *P. promelas* toxicity. Original samples were collected on 6/14/11, but due to laboratory error new samples needed to be collected on 6/15/11; Discharge not measured due to toxicity monitoring only.
Merced River @ Santa Fe	535XMRSFD	NM	High TSS 1-M , Irrigation4	07/12/11	12:50	None	
Merced River @ Santa Fe	535XMRSFD	NM	High TSS 1-P, High TSS 2-M, Irrigation5	08/09/11	10:40	None	Reported discharge may be incorrect. Discharge at two upstream stations are both at 300 cfs.
Merced River @ Santa Fe	535XMRSFD	NM, Sediment	Irrigation6	09/06/11	13:00	None	
Merced River @ Santa Fe	535XMRSFD	NM	Fall1	10/11/11	16:00	None	
Merced River @ Santa Fe	535XMRSFD	NM	Fall2	11/08/11	15:30	None	
Merced River @ Santa Fe	535XMRSFD	NM	Fall3	12/06/11	13:50	None	
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM, NM	Winter1, Management Plan Monitoring	01/18/11	13:20	None	January MPM for *S. capricornutum* toxicity.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM, NM	Storm1, Management Plan Monitoring, High TSS 1-M, High TSS 1-P	02/17/11	13:00	None	February MPM for *S. capricornutum* toxicity.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM, NM	Winter2, Management Plan Monitoring	03/15/11	13:20	None	March MPM for *C. dubia* toxicity.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM	Winter2, Management Plan Monitoring	03/17/11	16:10	None	March MPM for *H. azteca* toxicity; Discharge not measured due to sediment toxicity monitoring only.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM, NM	Irrigation1, Management Plan Monitoring	04/19/11	13:20	None	April MPM for *S. capricornutum* toxicity.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM, NM	Irrigation2, Management Plan Monitoring	05/10/11	12:50	None	May MPM for *S. capricornutum* toxicity.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	NM	Irrigation3	06/14/11	13:30	None	
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	NM	Irrigation3	06/15/11	15:20	None	June sampling for *P. promelas* toxicity. Original samples were collected on 6/14/11, but due to laboratory error new samples needed to be collected on 6/15/11; Discharge not measured due to toxicity monitoring only.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	NM	High TSS 1-M , Irrigation4	07/12/11	14:00	None	

Station Name	Station Code	Monitoring Event	Season/Group	Sample Date	Sample Time	Failure Reason	Sample Comments
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM, NM	High TSS 1-P, High TSS 2-M, Irrigation5, Management Plan Monitoring	08/09/11	12:30	None	August MPM for chlorpyrifos.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	MPM, NM	Irrigation6, Management Plan Monitoring	09/06/11	14:50	None	September MPM for *C. dubia* toxicity, *H. azteca* sediment toxicity, and chlorpyrifos; Discharge recorded as zero due to no measurable flow.
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	NM	Fall1	10/11/11	13:40	None	
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	NM	Fall2	11/08/11	12:30	None	
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	NM	Fall3	12/06/11	12:00	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Winter1	01/18/11	08:30	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Storm1, High TSS 1-M, High TSS 1-P	02/17/11	08:40	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Winter2	03/15/11	08:40	None	Too shallow to measure discharge.
Rodden Creek @ Rodden Rd	535XRCARD	Sediment	Winter2	03/17/11	18:30	None	Discharge not measured due to toxicity monitoring only.
Rodden Creek @ Rodden Rd	535XRCARD	NM	Irrigation1	04/19/11	08:30	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Irrigation2	05/10/11	08:50	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Irrigation3	06/14/11	08:40	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Irrigation3	06/15/11	12:00	None	June sampling for *P. promelas* toxicity. Original samples were collected on 6/14/11, but due to laboratory error new samples needed to be collected on 6/15/11; Discharge not measured due to toxicity monitoring only.
Rodden Creek @ Rodden Rd	535XRCARD	NM	High TSS 1-M , Irrigation4	07/12/11	08:20	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	High TSS 1-P, High TSS 2-M, Irrigation5	08/09/11	08:20	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM, Sediment	Irrigation6	09/06/11	08:40	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Fall1	10/11/11	09:50	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Fall2	11/08/11	08:20	None	
Rodden Creek @ Rodden Rd	535XRCARD	NM	Fall3	12/06/11	08:30	None	

High TSS 1-P - First high TSS monitoring event for organochlorine pesticides.
High TSS 1-M - First high TSS monitoring event for metals no longer applied by agriculture.
High TSS 2-M - Second high TSS monitoring event for metals no longer applied by agriculture.
MPM-Management Plan Monitoring
NM-Normal Monitoring
TSS- Total suspended solids

SAMPLING AND ANALYTICAL METHODS

Sample collection procedures and descriptions of the field instruments are provided in Tables 13 and Table 14, respectively. Site-specific discharge methods are provided in Table 15. Analytical methods and reporting limits (RLs) are provided in Table 16.

All field sampling and analytical methods were performed as outlined in the Standard Operating Procedures (SOPs) provided in the Quality Assurance Project Plan (QAPP) amended on October 20, 2010 (Appendix I through XXXVII). No deviations from these procedures occurred during the monitoring year.

Table 13. Sampling procedures

Analytical Parameter	Sample Volume[1]	Sample Container	Initial Preservation/Holding Requirements	Holding Time[2]
Physical Parameters[3]				
Total Dissolved Solids	500 mL	1x 2000 mL Polyethylene	Store at 4°C	7 Days
Total Suspended Solids	500 mL			7 Days
Turbidity	150 mL			48 Hours
Nutrients				
Soluble Orthophosphate[4]	1 L	1x 2000 mL Polyethylene	Store at 4°C	48 Hours
TKN[4], Ammonia, Total Phosphorus, Nitrate-Nitrite as N	500 mL	1x 500 mL Polyethylene	Preserve to ≤pH 2 with H_2SO_4, store at 4°C	28 Days
Metals/Trace Elements				
Metals/Trace Elements[5], Hardness[6]	500 mL	1x 500 mL Polyethylene	Filter as necessary; preserve to ≤pH 2 with HNO_3, store at 4°C	180 Days
Drinking Water				
E. coli (pathogens)	100 mL	1x 100 mL Polyethylene	Store at 4°C	24 Hours[7]
Total Organic Carbon	120 mL	3x 40 mL Amber glass VOA with PTFE-lined cap	Preserve with HCl, store at 4°C	28 Days
Pesticides				
Carbamates	1 L	1 L Amber Glass	Store at 4°C; extract within 7 days	40 Days
Organochlorines[4]	1 L	1 L Amber Glass	Store at 4°C; extract within 7 days	40 Days
Organophosphates	1 L	1 L Amber Glass	Store at 4°C; extract within 7 days	40 Days
Herbicides (general)	1 L	1 L Amber Glass	Store at 4°C; extract within 7 days	40 Days
Herbicides (paraquat dichloride)[4]	1 L	1x 1 L brown Polyethylene	Store at 4°C; extract within 7 days	21 days
Herbicides (glyphosate)[4]	80 mL	2x 40 mL Glass VOA	Store at 4°C; freeze (-20°C) within 2 weeks	6 Months
Water Column Toxicity				
Aquatic Toxicity	5 Gallons	5x 1 Gallon Amber Glass	Store at 4°C	36 Hours
Sediment				
Sediment Toxicity	2 L	2x 1 L Glass	Store at 4°C, do not freeze	28 Days
Sediment Grain Size[8]	250 mL	1x 250 mL Glass	Store at 4°C, do not freeze	28 days
Sediment Total Organic Carbon[8]	250 mL	1x 250 mL Glass	Store at 4°C, freeze (-20°C) within 48 hours	12 Months; Unfrozen 28 days
Sediment Chemistry	1 L	4x 250 mL Amber Glass	Store at 4°C, freeze (-20°C) within 48 hours	12 Months

[1] Additional volume may be required for Quality Control (QC) analyses.
[2] Holding time is after initial preservation or extraction.
[3] Volume of water necessary to analyze the physical parameters is typically combined in multiple 1L polyethylene bottles, which provides sufficient volume for re-analyses and lab spike duplicates, only possible when laboratory provides analyses for all physical parameters.
[4] Constituents dropped starting July 2011 (sampled during 1 storm and 1 irrigation event per year).
[5] Arsenic, cadmium and molybdenum were dropped starting July 2011 (sampled during 2 storms and 2 irrigation events per year).
[6] Includes arsenic, boron, cadmium, copper, lead, nickel, molybdenum, selenium, and zinc.
[7] Samples for bacteria analyses should be set up as soon as possible.
[8] Subcontracted to PTS Laboratories.
PTFE- Polytetraflouroethylene (Teflon™)
VOA-Volatile Organic Analyte

Table 14. Field parameters and instruments used to collect measurements

PARAMETER	INSTRUMENT
Dissolved Oxygen	YSI Model 556
Temperature	YSI Model 556
pH	YSI Model 556
Specific Conductance	YSI Model 556
Discharge	Marsh-McBirney Flow Mate 2000

YSI- Yellow Springs Instruments

Table 15. Site specific discharge methods for 2011

SITE	DISCHARGE METHOD	METER/ GAUGE
Bear Creek @ Kibby Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Berenda Slough along Ave 18 1/2	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Cottonwood Creek @ Rd 20	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Deadman Creek @ Hwy 59	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Dry Creek @ Rd 18	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Dry Creek @ Wellsford Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Duck Slough @ Gurr Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Duck Slough @ Hwy 99	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Highline Canal @ Hwy 99	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Highline Canal @ Lombardy Ave	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Howard Lateral @ Hwy 140	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Lateral 2 1/2 near Keyes Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Livingston Drain @ Robin Ave	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
McCoy Lateral @ Hwy 140	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Merced River @ Santa Fe Rd	DWR Gauge	California Data Exchange Center (CDEC) Merced River at Cressy (CRS)
Prairie Flower Drain @ Crows Landing	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Rodden Creek @ Rodden Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000

Table 16. Field and laboratory analytical methods

CONSTITUENT	MATRIX	ANALYZING LAB	RL	MDL	ANALYTICAL METHOD
Physical Parameters					
Flow	Fresh Water	Field Measure	1 cfs	NA	USGS R2Cross Streamflow Method
pH	Fresh Water	Field Measure	0.1 pH units	NA	EPA 150.1
Electrical Conductivity	Fresh Water	Field Measure	100 µmhos/cm	NA	EPA 120.1
Dissolved oxygen	Fresh Water	Field Measure	0.1 mg/L	NA	SM 4500-O
Temperature	Fresh Water	Field Measure	0.1 °C	NA	SM 2550
Turbidity	Fresh Water	Caltest	0.05 NTU	0.030 NTU	EPA 180.1
Total Dissolved Solids	Fresh Water	Caltest	10 mg/L	4 mg/L	SM 2540C
Total Suspended Solids	Fresh Water	Caltest	3 mg/L	2 mg/L	SM 2540D
Hardness	Fresh Water	Caltest	5 mg/L	1.7 mg/L	SM2340C
Total Organic Carbon	Fresh Water	Caltest	0.5 mg/L	0.30 mg/L	EPA 415.1
Pathogens					
Escherichia coli	Fresh Water	Caltest	1 MPN/ 100 mL	1 MPN/ 100 mL	SM 9223
Toxicity					
Water Column Toxicity	Fresh Water	AQUA-Science	NA	NA	EPA 821-R-02-012
	Fresh Water	AQUA-Science	NA	NA	EPA 821-R-02-013
Sediment Toxicity	Sediment	AQUA-Science	NA	NA	EPA 600/R-99-064
Carbamates					
Aldicarb	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
Carbaryl	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
Carbofuran	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
Methiocarb	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
Methomyl	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
Oxamyl	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
Organochlorines					
DDD[1]	Fresh Water	APPL Inc	0.01 µg/L	0.003 µg/L	EPA 8081A
DDE[1]	Fresh Water	APPL Inc	0.01 µg/L	0.004 µg/L	EPA 8081A
DDT[1]	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
Dicofol[1]	Fresh Water	APPL Inc	0.1 µg/L	0.01 µg/L	EPA 8081A
Dieldrin[1]	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
Endrin[1]	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
Methoxychlor[1]	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
Group A Pesticides					
Aldrin[1]	Fresh Water	APPL Inc	0.01 µg/L	0.009 µg/L	EPA 8081A
Chlordane[1]	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
Heptachlor[1]	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
Heptachlor epoxide[1]	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
Hexachlorocyclohexane (alpha-BHC)[1]	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
Hexachlorocyclohexane (beta-BHC)[1]	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
Hexachlorocyclohexane (gamma-BHC; Lindane)[1]	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
Hexachlorocyclohexane (delta-BHC)[1]	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
Endosulfan I[1]	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
Endosulfan II[1]	Fresh Water	APPL Inc	0.01 µg/L	0.004 µg/L	EPA 8081A
Toxaphene[1]	Fresh Water	APPL Inc	0.5 µg/L	0.380 µg/L	EPA 8081A

CONSTITUENT	MATRIX	ANALYZING LAB	RL	MDL	ANALYTICAL METHOD
Organophosphates					
Azinphos-methyl	Fresh Water	APPL Inc	0.1 µg/L	0.02 µg/L	EPA 8141A
Chlorpyrifos	Fresh Water	APPL Inc	0.015 µg/L	0.0026 µg/L	EPA 8141A
Diazinon	Fresh Water	APPL Inc	0.02 µg/L	0.004 µg/L	EPA 8141A
Dichlorvos	Fresh Water	APPL Inc	0.1 µg/L	0.02 µg/L	EPA 8141A
Dimethoate	Fresh Water	APPL Inc	0.1 µg/L	0.08 µg/L	EPA 8141A
Demeton-s	Fresh Water	APPL Inc	0.1 µg/L	0.01 µg/L	EPA 8141A
Disulfoton	Fresh Water	APPL Inc	0.05 µg/L	0.02 µg/L	EPA 8141A
Malathion	Fresh Water	APPL Inc	0.1 µg/L	0.05 µg/L	EPA 8141A
Methamidiphos	Fresh Water	APPL Inc	0.2 µg/L	0.1 µg/L	EPA 8321A
Methidathion	Fresh Water	APPL Inc	0.1 µg/L	0.04 µg/L	EPA 8141A
Parathion, methyl	Fresh Water	APPL Inc	0.1 µg/L	0.075 µg/L	EPA 8141A
Phorate	Fresh Water	APPL Inc	0.1 µg/L	0.07 µg/L	EPA 8141A
Phosmet	Fresh Water	APPL Inc	0.2 µg/L	0.06 µg/L	EPA 8141A
Herbicides					
Atrazine	Fresh Water	APPL Inc	0.5 µg/L	0.07 µg/L	EPA 619
Cyanazine	Fresh Water	APPL Inc	0.5 µg/L	0.09 µg/L	EPA 619
Diuron	Fresh Water	APPL Inc	0.4 µg/L	0.2 µg/L	EPA 8321A
Glyphosate[1]	Fresh Water	NCL Ltd	5 µg/L	1.7 µg/L	EPA 547M
Linuron	Fresh Water	APPL Inc	0.4 µg/L	0.2 µg/L	EPA 8321A
Paraquat dichloride[1]	Fresh Water	NCL Ltd	0.4 µg/L	0.19 µg/L	EPA 549.2M
Simazine	Fresh Water	APPL Inc	0.5 µg/L	0.08 µg/L	EPA 619
Trifluralin	Fresh Water	APPL Inc	0.05 µg/L	0.036 µg/L	EPA 8141A
Metals					
Arsenic[2]	Fresh Water	Caltest	0.5 µg/L	0.02 µg/L	EPA 200.8 (ICPMS Collision Cell)
Boron	Fresh Water	Caltest	10 µg/L	0.7 µg/L	EPA 200.8 (ICPMS Collision Cell)
Cadmium[2]	Fresh Water	Caltest	0.1 µg/L	0.04 µg/L	EPA 200.8 (ICPMS Collision Cell)
Copper	Fresh Water	Caltest	0.5 µg/L	0.07 µg/L	EPA 200.8 (ICPMS Collision Cell)
Lead[2]	Fresh Water	Caltest	0.25 µg/L	0.03 µg/L	EPA 200.8 (ICPMS Collision Cell)
Molybdenum[2]	Fresh Water	Caltest	0.25 µg/L	0.04 µg/L	EPA 200.8 (ICPMS Collision Cell)
Nickel	Fresh Water	Caltest	0.5 µg/L	0.04 µg/L	EPA 200.8 (ICPMS Collision Cell)
Selenium	Fresh Water	Caltest	1 µg/L	0.06 µg/L	EPA 200.8 (ICPMS Reaction Cell)
Zinc	Fresh Water	Caltest	1 µg/L	0.7 µg/L	EPA 200.8 (ICPMS Collision Cell)
Nutrients					
Total Kjeldahl Nitrogen[1]	Fresh Water	Caltest	0.1mg/L	0.07 mg/L	EPA 351.3
Nitrate + Nitrite (as N)	Fresh Water	Caltest	0.05 mg/L	0.02 mg/L	EPA 353.2
Total Ammonia	Fresh Water	Caltest	0.1 mg/L	0.040 mg/L	EPA 350.2
Total Phosphorus	Fresh Water	Caltest	0.01 mg/L	0.007 mg/L	EPA 365.2
Soluble Orthophosphate[1]	Fresh Water	Caltest	0.01 mg/L	0.006 mg/L	EPA 365.2
Sediment					
Bifenthrin	Sediment	Caltest	0.33 ng/g dw	0.1 ng/g dw	GCIS/NCI/SIM
Cyfluthrin	Sediment	Caltest	0.33 ng/g dw	0.11 ng/g dw	GCIS/NCI/SIM
Cypermethrin	Sediment	Caltest	0.33 ng/g dw	0.1 ng/g dw	GCIS/NCI/SIM
Deltamethrin: Tralomethrin	Sediment	Caltest	0.33 ng/g dw	0.12 ng/g dw	GCIS/NCI/SIM
Esfenvalerate	Sediment	Caltest	0.33 ng/g dw	0.13 ng/g dw	GCIS/NCI/SIM
Lambda-Cyhalothrin	Sediment	Caltest	0.33 ng/g dw	0.06 ng/g dw	GCIS/NCI/SIM
Permethrin	Sediment	Caltest	0.33 ng/g dw	0.11 ng/g dw	GCIS/NCI/SIM
Fenpropathrin	Sediment	Caltest	0.33 ng/g dw	0.07 ng/g dw	GCIS/NCI/SIM

CONSTITUENT	MATRIX	ANALYZING LAB	RL	MDL	ANALYTICAL METHOD
Chlorpyrifos	Sediment	Caltest	0.33 ng/g dw	0.12 ng/g dw	GCIS/NCI/SIM
Total Organic Carbon	Sediment	Caltest[3]	200 mg/kg dw	100 mg/kg dw	Walkley Black
Grain Size	Sediment	Caltest[3]	1% sand, silt, clay, gravel	0.4 µm	ASTM D422, ASTM D4464

cfs-Cubic Feet per Second
MDL- Minimum Detection Limit
MPN- Most Probable Number
NA- Not applicable
RL- Reporting Limit
[1] Constituents dropped starting July 2011 (sampled during 1 storm and 1 irrigation event per year).
[2] Constituents dropped starting July 2011 (sampled during 2 storms and 2 irrigation events per year).
[3] Subcontracted to PTS Laboratories.

PRECISION, ACCURACY AND COMPLETENESS

Normal surface water monitoring occurred seventeen times from January through December 2011; due to the large number of sites sampled during the irrigation season, sample collection occurred over two days during the months of May-September 2011. Twelve NM sites were sampled with the following exceptions due to lack of water:

- Cottonwood Creek @ Rd 20
  - Dry: 11/8/11, 12/6/11
- Duck Slough @ Gurr Rd
  - Dry: 12/6/11
- Highline Canal @ Hwy 99
  - Dry: 1/18/11, 2/17/11, 12/6/11
- Highline Canal @ Lombardy Rd
  - Dry: 12/6/11
- McCoy Lateral @ Hwy 140
  - Dry: 2/17/11, 3/15/11. 12/6/11

In May 2011, the Regional Board approved the reduction in monitoring for the following constituents: metals not applied by agriculture (arsenic, cadmium, lead and molybdenum), sediment bound pesticides (glyphosate, paraquat dichloride), and organochlorine pesticides no longer applied by agriculture (including Group A pesticides). Beginning in July 2011, monitoring of organochlorine pesticides, Group A pesticides, and glyphosate and paraquat was reduced to twice a year (the month of August plus a storm event), and arsenic, cadmium, lead and molybdenum monitoring was reduced to four times a year (July, August and two storm events). All updates to the monitoring schedule are included in the ESJWQC MRPP and are referenced in the Monitoring Objectives and Design section of this report.

Sediment sampling occurred in March and September of 2011: March 17, 2011 and September 6 and 13, 2011. No sites scheduled for sediment collection were dry.

During 2011, six MPM sites were sampled in addition to the NM sites. Table 9 in the Monitoring Objectives and Design section lists all MPM sites. The following MPM location was not sampled due to a lack of water:

- Livingston Drain @ Robin Ave
  - Dry: 1/18/11, 2/17/11

As required and outlined in the document “Irrigated Lands Regulatory Program General Procedures Sample Collection for Low Flow or No-Flow Conditions” the Coalition sampled both sediment and water under both no flow and low flow conditions. If a site had no flow, discharge was recorded as zero.

An assessment of precision, accuracy, and completeness is tabulated in Tables 17-30. The following is a narrative explanation for chemistry and toxicity precision, accuracy, and completeness.

CHEMISTRY

All results are tabulated in the Monitoring Results and Lab and Field Quality Control Results sections of this report (Appendix II, III, and Appendix X for Lateral 3 along East Taylor Rd). Each result is flagged if it does not meet data quality objectives (acceptability criteria) using Surface Water Ambient Monitoring Program (SWAMP) codes and can also be found in the SWAMP comparable database managed by the Coalition. The Coalition works with the Central Valley Regional Data Center (CVRDC) to ensure that all data remain SWAMP comparable and that all data are suitable for uploading to the California Environmental Data Exchange Network (CEDEN). A copy of the database is submitted to the Regional Board with the hardcopy of this report. The database includes all data from 2011.

For some constituents the concentration in the environmental sample may exceed the amount that the detector can detect and therefore the sample requires dilution. The result reported is the amount found in the diluted sample multiplied by the dilution factor to represent the amount of the analyte present in the original sample. The dilution factor is recorded and the reporting limit is increased by multiplying the reporting limit for that analyte by the dilution factor. Therefore, for each dilution that occurs, there is a corresponding increase in the limit of quantification.

For sediment chemistry constituents, varying Minimum Detection Limits (MDLs) and RLs can be due to differing initial weights of the samples or varying dry weight (dw) results of the samples based on a calculated percent solids value.

Chemistry Completeness

The constituents sampled from January through December 2011 are listed by site in Tables 5 and 6. Table 17 includes the specific analyte, the number of environmental samples collected and analyzed (including NM and MPM samples), the number of total samples collected (including environmental and field quality control samples), breakdown of the number and percentage of samples that were field blanks, field duplicates, equipment blanks, travel blanks and an overall assessment of completeness (number of samples collected versus number of samples analyzed). There was 100% completeness for environmental samples collected and analyzed for chemistry analyses except for glyphosate and paraquat (86.9%). Nine sites sampled in February 2011 were scheduled to be analyzed for glyphosate and paraquat. The sample shipment to the laboratory was lost in transit and this analysis did not take place resulting in an overall completeness of 99.7% for water chemistry and toxicity analysis. There was 100% completeness for sediment toxicity and chemistry for NM samples and 100% completeness for sediment toxicity for MPM samples.

For each sampling event, a field duplicate (FD) and field blank were collected from a station selected as the Quality Assurance/Quality Control (QA/QC) site. In addition, an equipment blank and travel blank were analyzed for dissolved metals and total metals, respectively, for each sampling event. Overall, field

blanks and field duplicates comprised more than 5% of samples collected for each analyte. Field blanks and field duplicates each comprised 9.5-10.3% of organic samples, 10.3% of *E. coli* samples, 8.9-10.3% of physical parameter samples, 10.3% of nutrient samples, 8.3-9.5% of dissolved metals and 8.3-9.5% of total metal samples. Equipment and travel blanks comprised 8.3-9.5% of dissolved and total metal samples, respectively (Table 17).

Field parameter measurements, including DO, discharge, pH, SC, and temperature were taken at each site for all sampling events, with the exception of dry sites. Discharge was measured at 67.7% of site visits and was not measured due to 1) only sediment and toxicity monitoring was conducted and measurement of discharge is not required (21), 3) the water was too deep to safely measure discharge (45), 4) the water being too swift to safely measure discharge (1), and 5) the water was too shallow to measure discharge (1). All instances where discharge was not measured are considered acceptable and do not count against completeness. Overall, all field parameters met 100% of the requirements for completeness (Table 17).

Batch Completeness

All chemistry batches were reviewed for QA/QC completeness. Two batches this sampling period were flagged as having incomplete quality control.

In January 2011, a single sample with a positive result for carbofuran was considered suspect by the laboratory due to possible contamination. The laboratory re-analyzed the sample with similar results. The sample was then re-extracted and re-analyzed in a separate batch outside of hold time with acceptable results. Matrix spikes were not re-extracted and were not run with the new batch due to a laboratory error. The batch duplicate was performed on the Laboratory Control Spike (LCS) meeting the requirements for precision.

In September 2011, a relative percent difference (RPD) criteria discrepancy was noticed by the laboratory for a Total Kjeldahl Nitrogen (TKN) field duplicate and its associated environmental sample. The samples were re-run, disconfirming the original results. Since the sample was also used for the only Matrix Spike (MS)/Matrix Spike Duplicate (MSD) in the original batch it was not possible to report the MS/MSD and due to lack of remaining volume the MS/MSD was unable to be re-analyzed. The batch duplicate was performed on the LCS meeting the requirements for precision.

Hold Time Compliance

Hold times for all chemistry analysis were met, except for one carbofuran batch in January 2011, one set of non-project nitrate + nitrite QC samples in March 2011, and two nitrate batches in June and July 2011. All samples are flagged accordingly. Overall hold time compliance for all chemistry analysis was 99.8%.

The January 2011 carbofuran batch was re-extracted outside of the 7 day hold time (21 days after sample collection) due to possible contamination issues during the original analysis. Re-analysis results were within normal range and did not confirm original results.

In March 2011 a set of nitrite + nitrate non-project samples (samples not collected as part of this project but included for QC completeness) were reanalyzed past hold time. All project samples in the batch were run within hold time requirements. In June 2011, there was a possible nitrate + nitrite sample mix-up by the laboratory at the time of the initial analysis; therefore all samples in the batch were re-run out of hold time. In July 2011, elevated concentrations were reported in several nitrate + nitrite samples, including a blank. The laboratory assumed the data were biased due to the high background levels recorded during the analysis, and consequently the batch was re-analyzed past the 28 day hold time. The laboratory scheduled lab management/QA meetings to discuss refining their system to eliminate or at least minimize sequencing and mix-up errors. Additional steps have been taken by the laboratory to insure that blank and nitrate + nitrite background levels are within control limits.

Chemistry Precision and Accuracy

A review of the number of samples analyzed and the percentage of samples (per analyte) that meet acceptability criteria are provided in the tables following this section (Tables 17 through 30). A brief overview is provided below to assess overall precision and accuracy for each analyte (all pesticides and metals are grouped and discussed together). Overall, precision and accuracy criteria were met for more than 90% of the samples for all analytes and all criteria.

Ammonia as N: One hundred percent of field blanks met acceptability criteria. Seventy-six percent of field duplicates had an RPD below 25% (13 of 17). The field duplicate RPDs above 25% were 31%, 93%, 52%, and 33%. Three of the four ammonia field duplicates and environmental sample pairs with high RPDs had at least one sample with an ammonia concentration below the RL. Results at or below the RL are estimates and therefore RPDs calculated on those numbers are likely to be outside of criteria. One hundred percent of laboratory blanks and LCSs met acceptability criteria. The MSs and MSDs were run with each batch and 100% met acceptability criteria for accuracy and precision.

Unionized ammonia values were determined by calculating the fraction of unionized ammonia in the total ammonia result based on field temperature and pH. Unionized ammonia values were calculated with the following formula:

Ammonia as N, unionized = Ammonia as N, total * f

Where:

f = unionized ammonia fraction of total ammonia
= $1/(10(pK_a-pH)+ 1$

pK_a = the temperature related equilibrium constant
= $0.0901821 + (2729.92/T_k)$

T_k = temperature in degrees Kelvin
= field temperature (°C) +273.2

pH = field pH

Ammonia and calculated unionized ammonia results are found in Table 6 in Appendix II and Table 9 in Appendix III; see Appendix X for results for samples from Lateral 3 along East Taylor Rd.

E. coli: Sterility checks of laboratory blanks, negative control and positive control samples were run for each batch. One hundred percent of laboratory blanks met acceptability criteria. One hundred percent of field blanks collected had *E. coli* counts less than the reporting limit of 1. Due to the nature of the analysis method and *E. coli* distribution within the water column, precision of *E. coli* analysis is conducted by evaluating Rlog values of environmental and duplicate samples with the Rlog criterion developed by the laboratory using similar samples. The mean Rlog for the laboratory was calculated to be 0.40. This value multiplied by 3.27 resulted in a precision criterion of 1.30. All laboratory and field duplicates had Rlog valuess below the criteria acceptance level.

Hardness: One hundred percent of hardness field blanks had concentrations below the reporting limit. Ninety-four percent of hardness field duplicates (16 of 17) met acceptability criteria. All laboratory blanks and LCSs met laboratory QC criteria. Eighty-four percent of MS samples met the acceptability criteria (32 of 38). Two MS/MSD pairs and two individual MS samples were recovered below the acceptability criteria - percent recovery (PR) 80-120. Four of the six MS/MSD samples were recovered low due to possible matrix interferences. Batch QC data were based on LCS and RPD data. One hundred percent of MSDs met acceptability criteria for precision (RPD < 25).

Inorganic analyses in sediment (grain size and Total Organic Carbon): Sediment grain size and total organic carbon were analyzed for both sets of sediment samples collected during 2011 (March 8 and September 6 and 13, 2011).

The Coalition QAPP lists the acceptable limit criterion for grain size duplicates as RSD ≤ 20% where RSD is the relative standard deviation (RSD). The RSD is traditionally defined as the standard deviation divided by the mean (equivalent to the Coefficient of Variation). The Coalition discussed with the sediment laboratory possible methods for evaluating sediment grain size precision, and it was agreed that evaluating the relative percent difference between grain size standard deviations of the environmental sample and the duplicate sample is the most suitable and accurate method for determining precision. Currently there is no standard method for evaluating precision of grain size analysis. Due to the nature of sediment and grain size analysis, results should be evaluated with the understanding that samples are not homogenous in grain size due to 1) settling of sediment within the sample container (affects laboratory duplicate precision) and 2) heterogeneity of the sediment in the field (affects field duplicate precision).

Individual grain size classes are reported as a percentage based on the composition of the entire sample and therefore are not values that can be evaluated individually (they are not independent from other percentages in the sample). Therefore it is more accurate to assess precision of the entire sample rather than each grain size class for both field and laboratory duplicates. The grain size standard deviation (SD) for all classes of a single sample was calculated using the following Folk and Ward (1957) Logarithmic equation:

$$SD = \sigma 1 = \frac{\Phi_{84} - \Phi_{16}}{4} + \frac{\Phi_{95} - \Phi_{5}}{6.6}$$

Where Φ_{84} = phi value of the 84th percentile sediment grain size category

Φ_{16} = phi value of the 16th percentile sediment grain size category
Φ_{95} = phi value of the 95th percentile sediment grain size category
Φ_{5} = phi value of the 5th percentile sediment grain size category

Precision was calculated based on the relative percent difference between the standard deviation of the environmental sample and the standard deviation of a duplicate sample using the following formula:

$$RPD_{SD} = \left| \frac{2(SD_i - SD_D)}{(SD_i + SD_D)} \right| \times 100$$

SD_i= standard deviation of the initial or environmental sample based on the Folk and War Logarithmic equation
SD_D= standard deviation of the field or laboratory duplicate sample based on the Folk and War Logarithmic equation

The criterion used in this report to assess precision for sediment grain size and sediment total organic carbon is $RPD_{SD} \leq 20\%$. The grain size field duplicates and laboratory duplicates RPD_{SD} were less than 20% (Table 30).

One hundred percent of the sediment TOC lab blank samples had results less than the RL. Sixty-seven percent (2 of 3) of the field duplicate samples were within acceptability criteria (RSD <20). One hundred percent of the TOC certified reference materials were within acceptability criteria (PR 75-125). The laboratory Certified Reference Materials (CRM) acceptability criteria varies in each of their reports and therefore the data are being evaluated based on the ILRP MRP acceptability requirement of 75-125%. Though not required, MS samples were run with both sets of samples and reported since the MSD served as the only lab duplicate in the batches. One hundred percent of MS samples were within acceptability criteria, and 100% of MSD samples met acceptability criteria for precision.

Metals (dissolved): Dissolved cadmium and lead monitoring was reduced to four times a year (July, August, and two storm events) in July 2011.

One hundred percent of dissolved metal field blanks met field precision criteria. Equipment blanks were analyzed with all dissolved metal batches and 100% met acceptability criteria. Laboratory blanks were run with each metals batch and 100% met acceptability criteria.

Dissolved metal field duplicate samples met acceptability criteria (FD RPD < 25%) for 90% of the samples analyzed except for: copper (12 of 17, 70.5%). The dissolved copper field duplicate RPDs greater than 25% were 25.3%, 42%, 36%, 44%, and 27%. All five field duplicate and associated environmental sample pairs had at least one result, if not both, below the reporting limit. When detections are below the reporting limit it is difficult to maintain precision due to the limitation of the instrument quantification. Four of the five total metal field duplicates and environmental samples collected at the same time had RPDs within acceptance criteria. Overall, field duplicate precision for all dissolved metals was 92%. The LCSs and MSs were within acceptable recovery limits for 100% of dissolved metals. All dissolved metal Laboratory Control Spike Duplicates (LCSDs) and MSDs met acceptance criteria for precision.

Metals (total): Arsenic, cadmium, lead and molybdenum monitoring was reduced to four times a year (July, August, and two storm events) beginning in July 2011.

One hundred percent of field and travel blanks for total metals met acceptability criteria. Laboratory blanks were run with each total metals batch and 100% met acceptability criteria.

All total metal field duplicates, except for total boron, met acceptability criteria (FD RPD < 25) for at least 90% of samples. Eighty-two percent of total boron field duplicate samples met acceptability criteria (14 of 17). All three pairs of field duplicate and environmental samples had at least one sample result below the RL of 10 µg/L (estimated results) most likely resulting in the high RPD for the boron duplicates. When detections are below the reporting limit it is difficult to maintain precision due to the limitation of the instrument quantification.

The LCS samples were within acceptable recovery limits for 100% of samples. The MS sample recoveries were within control limits for 98.6% of all samples analyzed for total metals. Total metals had 100% of LCSD and MSD samples meet the acceptability criteria for precision (RPD < 25%).

Nitrate + Nitrite as N: One hundred percent of field blanks met acceptability criteria (< RL). Sixty-five percent of field duplicates had RPDs below 25% (11 of 17). Of the six instances of high RPDs, three of the pairs' field duplicate and associated environmental results were above the RL (and one instance involved an undiluted field duplicate result being compared to a diluted environmental result), one pair had a field duplicate result slightly above the RL and an associated environmental result less than the reporting limit, and two pairs' field duplicate and associated environmental results were both less than the RL of 0.05 mg/L.

Laboratory blanks and LCS samples were run with each batch and 100% of the samples met acceptance criteria. Ninety-three percent of MS were within the acceptability criteria (40 of 41). One hundred percent of MSD samples met the acceptability requirement for precision.

Nitrogen, Total Kjeldahl (TKN): One hundred percent of field blanks met acceptance criteria. Lab blanks were run with every batch and 96% were less than the RL (22 of 23). The single blank concentration above the RL of 0.1 mg/L was just slightly above at 0.11 mg/L. The batch associated with the low level contamination only had one project sample in it, a field blank, with a concentration less than the RL.

Fifty-nine percent of field duplicates had RPDs below 25% (10 of 17). The field duplicate RPDs above the acceptance criteria were 36%, 47%, 32%, 32%, 27%, 90%, and 67.5%. All field SOPs were followed including collecting the environmental and field duplicate samples at the same time and immediately adjacent to one another in the water column.

Laboratory control spikes were within acceptance criteria for all batches. Matrix spikes were performed in each batch with 93% meeting acceptability requirements (41 of 44). All three MS/MSD samples that

did not meet acceptability requirements were non-project samples. Two were recovered below control limits (PR 90-110) due to possible matrix interferences, and one MS was recovered high and was spiked with less than one-half the sample concentration. For all cases the batch QC data was accepted based on LCS and RPD results. One hundred percent of LCSDs and 95% (21 of 22) of MS duplicates met the requirements for precision.

Orthophosphate as P: One hundred percent of field blanks and field duplicates met acceptance criteria. Lab blanks were run with every batch and 100% were less than the reporting limit. The LCSs were within acceptability criteria for all batches. The MS samples were performed in each batch with 100% meeting acceptability criteria. All MSD samples met the requirements of precision.

Pesticides: Pesticides were analyzed in eight different groups: organochlorines (EPA 8081A), Group A pesticides (EPA 8081A), organophosphates (EPA 8141A), carbamates (EPA 8321A), methamidophos (EPA 8321A), paraquat (EPA 549.2), glyphosate (EPA 547M) and triazines (EPA 619). Starting in July 2011, the monitoring of four groups of pesticides (organochlorines, Group A pesticides, glyphosate and paraquat) was reduced to twice a year; August and a single storm event. Field blanks were run with each batch and 100% met acceptability criteria. Lab blanks were run with each batch and 100% of the samples met acceptability criteria. All field duplicates had RPDs less than 25%.

Surrogates were run for each applicable pesticide analysis (surrogates are not performed for glyphosate and paraquat analysis). Surrogate recoveries were within specific acceptance criteria for 97.1% of all samples analyzed. When a surrogate is recovered outside of the acceptability criteria, the associated environmental sample is flagged as well. Batches are approved by evaluating all measures of precision and accuracy meaning that although a single quality control sample may be outside of acceptability criteria, the entire batch may be accepted due to the other quality control samples within that batch meeting acceptability criteria.

The MS and LCS samples were analyzed in each batch to assess accuracy as well as possible matrix interference. Either a MSD and/or a LCSD were performed in each batch to assess precision. Ninety-eight percent of MS samples run were within acceptability criteria. The individual pesticides with less than 90% of samples within acceptable recoveries for MS samples include paraquat (44.4%) and dimethoate (85.3%). Five pairs of MS/MSD samples were below the control limit for paraquat (PR 70-130) due to possible matrix effects. All but one environmental sample were non-detect in the five batches, and all but one of the remaining LCS/LCSD samples were within range. Two pairs of MS/MSD and a single MSD sample were below control limits (PR 68-202) for dimethoate. All associated environmental samples were non-detect and all had LCS samples within acceptability range.

All LCS samples met the acceptability criteria for at least 90% of the samples analyzed except for dimethoate (88.8%) and methamidophos (88.2%). Two dimethoate LCS samples were recovered below the acceptability criteria. In one instance the associated MS/MSD was recovered within the acceptable range and a single environmental sample detection occurred in the same batch. In the second occurrence, the MS/MSD was also below control limits and all environmental samples were non-detect. Since all QC criteria were recovered below control limits, the entire batch was re-extracted and re-

analyzed out of hold time and all QC results were within the acceptability criteria. Both methamidophos LCS samples were outside acceptability criteria and recovered low (PR 25-136). All associated environmental samples were non-detect and were in analyzed in batches with MS/MSD samples that recovered within the acceptable range.

Laboratory precision assessed by the RPD of laboratory duplicates, met acceptability criteria in 96.1% of matrix spike duplicates. The individual pesticides with less than 90% of samples within acceptable recoveries for matrix spike duplicates include paraquat 78% (7 of 9), phosmet 88% (15 of 17), and methamidophos 82% (14 of 17). The two paraquat RPDs above the QC limit (29% and 79%) may have been due to possible matrix effects in the QC samples that resulted in low recoveries in the spiked samples (below the lower limit of 70%). The LCS/LCSD RPD was within limits for both paraquat batches and therefore precision requirements were met. Paraquat is a notoriously difficult analyte with which to work due to it high organic carbon partitioning coefficient which results in matrix interference and low recoveries even in laboratory blank water. In one phosmet batch, the MS/MSD percent recoveries were within the acceptability criteria and all environmental samples were non-detect. The other high phosmet RPD coincided with low MS/MSD percent recoveries. The batch was re-extracted out of hold time and all results were within control limits. All three methamidophos batches with RPDs above acceptability criteria, 26.6%, 35.8%, and 26.3%, were accepted based on MS/MSD and LCS results. All associated environmental results for methamidophos were non-detect.

The Coalition supplies the laboratory with sufficient sample water to perform MS and MSD for every 20 samples. Therefore, the laboratory will usually only perform an LCSD in a batch when there is no MSD. Both laboratory and MSDs can be used to assess precision. Glyphosate and paraquat batches always include an LCSD. Eighteen batches analyzed in 2011 were run with an LCSD either in lieu of an MSD or along with an MSD. Laboratory precision assessed by the RPD of LCSDs, met acceptability criteria in 100% of samples.

Phosphate as P: Field blanks met acceptance criteria in 100% of the samples collected. Eighty-two percent of field duplicates had RPDs less than 25% (14 of 17). The field duplicate and environmental sample concentrations associated with the high RPDs ranged from 0.008 mg/L to 0.049 mg/L (RL is 0.01 mg/L); due to such low concentrations it is difficult to obtain RPDs of less than 25%. Laboratory blanks and LCS samples were within acceptability criteria for all batches. One hundred percent of MS and MSD samples met acceptability criteria for accuracy and precision.

Sediment Pesticides: Sediment pesticides were analyzed for any sediment sample that exhibited significant *H. azteca* toxicity. One sediment sample in September 2011 was analyzed for additional pesticides (chlorpyrifos and pyrethroids).

Field duplicates were analyzed for the single sediment pesticide batch; all pesticides had an RPD less than 25% except for bifenthrin and chlorpyrifos (both 0 of 1). The bifenthrin environmental sample result was less than the RL of 0.33 ng/g dw (estimated value) and the associated field duplicate was slightly above, 0.49 ng/g dw. Both chlorpyrifos field duplicate and environmental sample concentrations were less than the RL, 0.21 and 0.15 ng/g dw respectively. An MS and LCS were performed to assess

accuracy for each pesticide analyzed. One hundred percent of MS and LCS samples met acceptance criteria. Laboratory precision met acceptability criteria in 100% of LCSD samples.

Surrogates were run for each sediment pesticide analysis. Since the previous 2011 AMR, the laboratory refined its extraction and analytical procedures for sediment pyrethroid analysis. Surrogate recoveries for the 2011 data were evaluated using an MS PR range of 50-150 and an LCS PR of 76-172. Surrogate recoveries were within specific acceptance criteria for 100% of all samples analyzed.

Total Dissolved Solids (TDS): Field blanks met acceptability criteria in 100% of the samples analyzed. Lab blanks were run with every batch and met acceptance criteria for all samples.

Eighty-two percent of field duplicates had RPDs less than 25% (14 of 17). Re-analysis in triplicate of one of the high RPD field duplicate/environmental sample pairs confirmed the original results. The LCS samples met acceptability criteria in 100% of the samples analyzed. Ninety-one percent (20 of 22) of lab duplicates met the batch precision requirements, RPD < 25%. Samples were also analyzed in triplicate past hold time with similar results. Separate environmental/lab duplicate pairs with RPDs within range were run in the batches and recorded for reference. Matrix spikes are not performed for total dissolved solid analysis.

Total Organic Carbon (TOC): One hundred percent of field blanks met acceptability criteria. One hundred percent of field duplicates had RPDs less than 25%. Laboratory blanks and LCSs met acceptance criteria for 100% of the samples. One hundred percent of MS and MSD samples analyzed met acceptability requirements.

Total Suspended Solids (TSS): Ninety-four percent of field blanks met acceptability criteria (16 of 17). The single field blank not meeting acceptability criteria (14 mg/L in the blank result) had an associated environmental sample result above the reporting limit (5 mg/L in the environmental result). The associated lab blank in the batch was non-detect. Contamination in the field may be due to contamination of the field blank water, the field blank storage container, the field blank bottle, or contamination from the sampler. All sampling SOPs, which include the steps to prevent contamination, were followed and no other blanks collected at that time had detections above the reporting limits of any other constituents. Other sources of contamination may have occurred during transport from the field to the laboratory (all bottles were closed tightly and only touched when being put in the cooler by the sampler and taken from the cooler by the laboratory with gloved hands).

Eighty-two percent of field duplicates (14 of 17) had RPDs less than 25%. The three field duplicate RPDs greater than 25% ranged from 45% - 126%, and all field duplicate and associated environmental sample results were above the reporting limit (3 mg/L). All sampling SOPs were followed to ensure that field duplicates are collected at the same time and manner as the associated environmental sample. It is likely that the difference in total suspended solids results is due to heterogeneity of the water column and the detection limitations of the analysis.

One hundred percent of lab blanks and LCS samples met acceptance criteria. Ninety-six percent of laboratory duplicates met acceptance criteria (< RPD 25%). Both the environmental sample and lab duplicate result were less than the RL. A non-project environmental sample and lab duplicate were run with the batch and the associated RPD was less than 25%. Matrix spikes are not performed for total suspended solids.

Turbidity: One hundred percent of field blanks and 100% of field duplicates met acceptability criteria. Laboratory blanks were run with every batch and 100% were less than the reporting limit. The LCS and laboratory duplicates were analyzed with each batch and all of the samples met acceptance criteria. Matrix spike are not performed for turbidity.

TOXICITY

For aquatic toxicity testing, the acceptability of test results is determined primarily by performance-based criteria for test organisms, culture and test conditions, and the results of control bioassays. Control bioassays include monthly reference toxicant testing and negative and solvent controls (for Toxicity Identification Evaluations (TIEs)). Test acceptability requirements are documented in the method documents for each bioassay method and are included in the ESJWQC QAPP. In addition to the quality assurance requirements for the toxicity testing methods, a field duplicate must be collected with each sampling event or every 20 samples, whichever is more frequent. Field duplicates were collected every sampling event. The overall percentage of field duplicates are as follows: *C. dubia* 11.3%, *P. promelas* 11.5%, *S. capricornutum* 10.9%, and *H. azteca* 10.3%.

Water Column Toxicity: Field duplicates were collected during each monitoring event and were tested for toxicity to *C. dubia*, *S. capricornutum* and *P. promelas* (Table 29). All three species had 100% of field duplicates within the acceptability criteria (RPD < 25%) except for *S. capricornutum* (15 of 17 field duplicates had RPDs less than 25%). Neither the *S. capricornutum* field duplicates nor environmental samples associated with the high RPDs (83.3% and 70%) exhibited significant toxicity compared to the control. All tests met holding time requirements (< 36 hours), water quality requirements and control requirements (as listed in the EPA method guidelines).

Sediment Toxicity: Sediment was collected on March 17, 2011 and September 6 and 13, 2011. Three field duplicates were collected and all had RPDs less than 25% (Table 29). One hundred percent of the sediment samples had laboratory control negatives within acceptability criteria. All sediment samples met holding time criteria.

Table 17. ESJWQC environmental sample, field quality, and field parameter counts and percentages

Samples collected from January through December 2011; sorted by method and analyte.

Method	Analyte	Env. Samples Collected (#)	Env. Samples Analyzed (#)	Env. Samples Completeness (%)	Env. and Field QC Samples Analyzed (#)	Field Blanks (#)	Field Blanks (%)	Field Dup. (#)	Field Dup. (%)	Equip. Blank (#)	Equip. Blank (%)	Travel Blank (#)	Travel Blank (%)
EPA 8321A CARB	Aldicarb	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8321A CARB	Carbaryl	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8321A CARB	Carbofuran	132	132	100.0%	166	17	10.2%	17	10.2%		NA		NA
EPA 8321A CARB	Methiocarb	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8321A CARB	Methomyl	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8321A CARB	Oxamyl	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8321A CARB	Diuron	133	133	100.0%	167	17	10.2%	17	10.2%		NA		NA
EPA 8321A CARB	Linuron	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 619	Atrazine	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 619	Cyanazine	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 619	Simazine	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 547M	Glyphosate	69	60	86.9%	87	9	10.3%	9	10.3%		NA		NA
EPA 549.2M	Paraquat dichloride	69	60	86.9%	87	9	10.3%	9	10.3%		NA		NA
EPA 8081A	DDD(p,p')	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	DDE(p,p')	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	DDT(p,p')	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Dicofol	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Dieldrin	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Endrin	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Methoxychlor	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Aldrin	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Chlordane	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Heptachlor	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Heptachlor epoxide	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	HCH, alpha	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	HCH, beta	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	HCH, delta	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	HCH, gamma	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Endosulfan I	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Endosulfan II	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8081A	Toxaphene	78	78	100.0%	98	10	10.2%	10	10.2%		NA		NA
EPA 8141A OP	Azinphos methyl	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Chlorpyrifos	145	145	100.0%	179	17	9.5%	17	9.5%		NA		NA
EPA 8141A OP	Diazinon	132	132	100.0%	166	17	10.2%	17	10.2%		NA		NA
EPA 8141A OP	Dichlorvos	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA

Method	Analyte	Env. Samples Collected (#)	Env. Samples Analyzed (#)	Env. Samples Completeness (%)	Env. and Field QC Samples Analyzed (#)	Field Blanks (#)	Field Blanks (%)	Field Dup. (#)	Field Dup. (%)	Equip. Blank (#)	Equip. Blank (%)	Travel Blank (#)	Travel Blank (%)
EPA 8141A OP	Dimethoate	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Demeton-s	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Disulfoton	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Malathion	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Methidathion	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Parathion, Methyl	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Phorate	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Phosmet	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8141A OP	Trifluralin	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 8321A	Methamidophos	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	156	156	100.0%	190	17	8.9%	17	8.9%		NA		NA
EPA 160.1	Total Dissolved Solids	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 160.2	Total Suspended Solids	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 180.1	Turbidity	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 350.2	Ammonia as N	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 351.3	Nitrogen, Total Kjeldahl	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 353.2	Nitrate + Nitrite as N	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 365.2	OrthoPhosphate as P	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 365.2	Phosphate as P	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 415.1	Total Organic Carbon	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
SM 9223B	*E. coli*	131	131	100.0%	165	17	10.3%	17	10.3%		NA		NA
EPA 200.8	Arsenic	90	90	100.0%	126	12	9.5%	12	9.5%		NA	12	9.5%
EPA 200.8	Boron	131	131	100.0%	182	17	9.3%	17	9.3%		NA	17	9.3%
EPA 200.8	Cadmium	90	90	100.0%	126	12	9.5%	12	9.5%		NA	12	9.5%
EPA 200.8	Copper	155	155	100.0%	206	17	8.3%	17	8.3%		NA	17	8.3%
EPA 200.8	Lead	101	101	100.0%	140	13	9.3%	13	9.3%		NA	13	9.3%
EPA 200.8	Molybdenum	90	90	100.0%	126	12	9.5%	12	9.5%		NA	12	9.5%
EPA 200.8	Nickel	131	131	100.0%	182	17	9.3%	17	9.3%		NA	17	9.3%
EPA 200.8	Selenium	126	126	100.0%	174	16	9.2%	16	9.2%		NA	16	9.2%
EPA 200.8	Zinc	131	131	100.0%	182	17	9.3%	17	9.3%		NA	17	9.3%
EPA 200.8	Cadmium (Dissolved)	90	90	100.0%	126	12	9.5%	12	9.5%	12	9.5%		NA
EPA 200.8	Copper (Dissolved)	155	155	100.0%	206	17	8.3%	17	8.3%	17	8.3%		NA
EPA 200.8	Lead (Dissolved)	101	101	100.0%	140	13	9.3%	13	9.3%	13	9.3%		NA
EPA 200.8	Nickel (Dissolved)	131	131	100.0%	182	17	9.3%	17	9.3%	17	9.3%		NA
EPA 200.8	Zinc (Dissolved)	131	131	100.0%	182	17	9.3%	17	9.3%	17	9.3%		NA
Walkley-Black	Total Organic Carbon (sediment)	26	26	100.0%	29		NA	3	10.3%		NA		NA
EPA 8270M_NCI	Bifenthrin	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 8270M_NCI	Chlorpyrifos	1	1	100.0%	2		NA	1	50%		NA		NA

Method	Analyte	Env. Samples Collected (#)	Env. Samples Analyzed (#)	Env. Samples Completeness (%)	Env. and Field QC Samples Analyzed (#)	Field Blanks (#)	Field Blanks (%)	Field Dup. (#)	Field Dup. (%)	Equip. Blank (#)	Equip. Blank (%)	Travel Blank (#)	Travel Blank (%)
EPA 8270M_NCI	Cyfluthrin	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 8270M_NCI	Cyhalothrin, lambda	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 8270M_NCI	Cypermethrin	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 8270M_NCI	Deltamethrin:Tralomethrin	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 8270M_NCI	Fenpropathrin	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 8270M_NCI	Permethrin	1	1	100.0%	2		NA	1	50%		NA		NA
EPA 821/R-02-012	*Ceriodaphnia dubia*	133	133	100.0%	150		NA	17	11.3%		NA		NA
EPA 821/R-02-012	*Pimephales promelas*	131	131	100.0%	148		NA	17	11.5%		NA		NA
EPA 821/R-02-013	*Selenastrum capricornutum*	138	138	100.0%	155		NA	15	9.6%		NA		NA
EPA 600/R-99-064	*Hyalella azteca*	26	26	100.0%	29		NA	3	10.3%		NA		NA
USGS R2Cross streamflow or DWR Gauge	Discharge, cfs	211	143	67.7%	NA		NA		NA		NA		NA
SM 4500-O	Dissolved Oxygen, mg/L	211	211	100.0%	NA		NA		NA		NA		NA
EPA 150.1	pH	211	211	100.0%	NA		NA		NA		NA		NA
EPA 120.1	Specific Conductivity, uS/cm	211	211	100.0%	NA		NA		NA		NA		NA
SM 2550	Temperature, Deg C	211	211	100.0%	NA		NA		NA		NA		NA
	TOTAL	**9472**	**9386**	**99.1%**	**10730**	**1019**	**9.9%**	**1083**	**10.1%**	**76**	**9.1%**	**133**	**9.2%**

NA- Not applicable

Table 18. ESJWQC summary of field blank Quality Control sample evaluations

Samples collected from January through December 2011, sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	<RL or < (env sample/5)	17	17	100.00
EPA 8321A CARB	Carbaryl	<RL or < (env sample/5)	17	17	100.00
EPA 8321A CARB	Carbofuran	<RL or < (env sample/5)	17	17	100.00
EPA 8321A CARB	Methiocarb	<RL or < (env sample/5)	17	17	100.00
EPA 8321A CARB	Methomyl	<RL or < (env sample/5)	17	17	100.00
EPA 8321A CARB	Oxamyl	<RL or < (env sample/5)	17	17	100.00
EPA 8321A CARB	Diuron	<RL or < (env sample/5)	17	17	100.00
EPA 8321A CARB	Linuron	<RL or < (env sample/5)	17	17	100.00
EPA 619	Atrazine	<RL or < (env sample/5)	17	17	100.00
EPA 619	Cyanazine	<RL or < (env sample/5)	17	17	100.00
EPA 619	Simazine	<RL or < (env sample/5)	17	17	100.00
EPA 547M	Glyphosate	<RL or < (env sample/5)	9	9	100.00
EPA 549.2M	Paraquat dichloride	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	DDD(p,p')	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	DDE(p,p')	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	DDT(p,p')	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Dicofol	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Dieldrin	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Endrin	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Methoxychlor	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Aldrin	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Chlordane	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Heptachlor	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Heptachlor epoxide	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	HCH, alpha	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	HCH, beta	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	HCH, delta	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	HCH, gamma	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Endosulfan I	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Endosulfan II	<RL or < (env sample/5)	10	10	100.00
EPA 8081A	Toxaphene	<RL or < (env sample/5)	10	10	100.00
EPA 8141A OP	Azinphos methyl	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Chlorpyrifos	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Diazinon	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Dichlorvos	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Dimethoate	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Demeton-s	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Disulfoton	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Malathion	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Methidathion	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Parathion, Methyl	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Phorate	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Phosmet	<RL or < (env sample/5)	17	17	100.00
EPA 8141A OP	Trifluralin	<RL or < (env sample/5)	17	17	100.00
EPA 8321A	Methamidophos	<RL or < (env sample/5)	17	17	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	<RL or < (env sample/5)	17	17	100.00
EPA 160.1	Total Dissolved Solids	<RL or < (env sample/5)	17	17	100.00
EPA 160.2	Total Suspended Solids	<RL or < (env sample/5)	17	16	94.12
EPA 180.1	Turbidity	<RL or < (env sample/5)	17	17	100.00
EPA 350.2	Ammonia as N	<RL or < (env sample/5)	17	17	100.00
EPA 351.3	Nitrogen, Total Kjeldahl	<RL or < (env sample/5)	17	17	100.00
EPA 353.2	Nitrate + Nitrite as N	<RL or < (env sample/5)	17	17	100.00
EPA 365.2	OrthoPhosphate as P	<RL or < (env sample/5)	17	17	100.00
EPA 365.2	Phosphate as P	<RL or < (env sample/5)	17	17	100.00
EPA 415.1	Total Organic Carbon	<RL or < (env sample/5)	17	17	100.00

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
SM 9223B	*E. coli*	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Arsenic	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Boron	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Cadmium	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Copper	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Lead	<RL or < (env sample/5)	13	13	100.00
EPA 200.8	Molybdenum	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Nickel	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Selenium	<RL or < (env sample/5)	16	16	100.00
EPA 200.8	Zinc	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Cadmium (Dissolved)	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Copper (Dissolved)	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Lead (Dissolved)	<RL or < (env sample/5)	13	13	100.00
EPA 200.8	Nickel (Dissolved)	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Zinc (Dissolved)	<RL or < (env sample/5)	17	17	100.00
Walkley-Black	Total Organic Carbon (sediment)	NA			NA
EPA 8270M_NCI	Bifenthrin (sediment)	NA			NA
EPA 8270M_NCI	Chlorpyrifos (sediment)	NA			NA
EPA 8270M_NCI	Cyfluthrin (sediment)	NA			NA
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	NA			NA
EPA 8270M_NCI	Cypermethrin (sediment)	NA			NA
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	NA			NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	NA			NA
EPA 8270M_NCI	Fenpropathrin (sediment)	NA			NA
EPA 8270M_NCI	Permethrin (sediment)	NA			NA
		TOTAL	**1019**	**1018**	**99.90**

NA-Not applicable

Table 19. ESJWQC summary of equipment blank (dissolved metals) and travel blank (total metals) Quality Control sample evaluations.

Samples collected from January through December 2011, sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 200.8	Arsenic	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Boron	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Cadmium	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Copper	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Lead	<RL or < (env sample/5)	13	13	100.00
EPA 200.8	Molybdenum	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Nickel	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Selenium	<RL or < (env sample/5)	16	16	100.00
EPA 200.8	Zinc	<RL or < (env sample/5)	17	17	100.00
		TOTAL	**133**	**133**	**100.00**
EPA 200.8	Cadmium (Dissolved)	<RL or < (env sample/5)	12	12	100.00
EPA 200.8	Copper (Dissolved)	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Lead (Dissolved)	<RL or < (env sample/5)	13	13	100.00
EPA 200.8	Nickel (Dissolved)	<RL or < (env sample/5)	17	17	100.00
EPA 200.8	Zinc (Dissolved)	<RL or < (env sample/5)	17	17	100.00
		TOTAL	**76**	**76**	**100.00**

Table 20. ESJWQC summary of field duplicate Quality Control sample evaluations.

Samples collected from January through December 2011, sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Carbaryl	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Carbofuran	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Methiocarb	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Methomyl	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Oxamyl	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Diuron	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Linuron	RPD ≤ 25	17	17	100.00
EPA 619	Atrazine	RPD ≤ 25	17	17	100.00
EPA 619	Cyanazine	RPD ≤ 25	17	17	100.00
EPA 619	Simazine	RPD ≤ 25	17	17	100.00
EPA 547M	Glyphosate	RPD ≤ 25	9	9	100.00
EPA 549.2M	Paraquat dichloride	RPD ≤ 25	9	9	100.00
EPA 8081A	DDD(p,p')	RPD ≤ 25	10	10	100.00
EPA 8081A	DDE(p,p')	RPD ≤ 25	10	10	100.00
EPA 8081A	DDT(p,p')	RPD ≤ 25	10	10	100.00
EPA 8081A	Dicofol	RPD ≤ 25	10	10	100.00
EPA 8081A	Dieldrin	RPD ≤ 25	10	10	100.00
EPA 8081A	Endrin	RPD ≤ 25	10	10	100.00
EPA 8081A	Methoxychlor	RPD ≤ 25	10	10	100.00
EPA 8081A	Aldrin	RPD ≤ 25	10	10	100.00
EPA 8081A	Chlordane	RPD ≤ 25	10	10	100.00
EPA 8081A	Heptachlor	RPD ≤ 25	10	10	100.00
EPA 8081A	Heptachlor epoxide	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, alpha	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, beta	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, delta	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, gamma	RPD ≤ 25	10	10	100.00
EPA 8081A	Endosulfan I	RPD ≤ 25	10	10	100.00
EPA 8081A	Endosulfan II	RPD ≤ 25	10	10	100.00
EPA 8081A	Toxaphene	RPD ≤ 25	10	10	100.00
EPA 8141A OP	Azinphos methyl	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Chlorpyrifos	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Diazinon	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Dichlorvos	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Dimethoate	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Demeton-s	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Disulfoton	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Malathion	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Methidathion	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Parathion, Methyl	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Phorate	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Phosmet	RPD ≤ 25	17	17	100.00
EPA 8141A OP	Trifluralin	RPD ≤ 25	17	17	100.00
EPA 8321A	Methamidophos	RPD ≤ 25	17	17	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 25	17	16	94.12
EPA 160.1	Total Dissolved Solids	RPD ≤ 25	17	14	82.35
EPA 160.2	Total Suspended Solids	RPD ≤ 25	17	14	82.35
EPA 180.1	Turbidity	RPD ≤ 25	17	17	100.00
EPA 350.2	Ammonia as N	RPD ≤ 25	17	13	76.47
EPA 351.3	Nitrogen, Total Kjeldahl	RPD ≤ 25	17	10	58.82
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 25	17	11	64.71
EPA 365.2	OrthoPhosphate as P	RPD ≤ 25	17	17	100.00
EPA 365.2	Phosphate as P	RPD ≤ 25	17	14	82.35
EPA 415.1	Total Organic Carbon	RPD ≤ 25	17	17	100.00

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
SM 9223B	*E. coli*	Rlog ≤ 1.30	17	17	100.00
EPA 200.8	Arsenic	RPD ≤ 25	12	12	100.00
EPA 200.8	Boron	RPD ≤ 25	17	14	82.35
EPA 200.8	Cadmium	RPD ≤ 25	12	12	100.00
EPA 200.8	Copper	RPD ≤ 25	17	16	94.12
EPA 200.8	Lead	RPD ≤ 25	13	12	92.31
EPA 200.8	Molybdenum	RPD ≤ 25	12	12	100.00
EPA 200.8	Nickel	RPD ≤ 25	17	17	100.00
EPA 200.8	Selenium	RPD ≤ 25	16	15	93.75
EPA 200.8	Zinc	RPD ≤ 25	17	16	94.12
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 25	12	12	100.00
EPA 200.8	Copper (Dissolved)	RPD ≤ 25	17	12	70.59
EPA 200.8	Lead (Dissolved)	RPD ≤ 25	13	13	100.00
EPA 200.8	Nickel (Dissolved)	RPD ≤ 25	17	16	94.12
EPA 200.8	Zinc (Dissolved)	RPD ≤ 25	17	17	100.00
Walkley-Black	Total Organic Carbon (sediment)	RSD ≤ 20	3	2	66.67
EPA 8270M_NCI	Bifenthrin (sediment)	RPD <25	1	0	0.00
EPA 8270M_NCI	Chlorpyrifos (sediment)	RPD <25	1	0	0.00
EPA 8270M_NCI	Cyfluthrin (sediment)	RPD <25	1	1	100.00
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	RPD <25	1	1	100.00
EPA 8270M_NCI	Cypermethrin (sediment)	RPD <25	1	1	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	RPD <25	1	1	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	RPD <25	1	1	100.00
EPA 8270M_NCI	Fenpropathrin (sediment)	RPD <25	1	1	100.00
EPA 8270M_NCI	Permethrin (sediment)	RPD <25	1	1	100.00
		TOTAL	**1031**	**988**	**95.83**

Table 21. ESJWQC summary of method blank Quality Control sample evaluations.

Samples analyzed in batches with samples collected from January through December 2011, sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	<RL	17	17	100.00
EPA 8321A CARB	Carbaryl	<RL	17	17	100.00
EPA 8321A CARB	Carbofuran	<RL	18	18	100.00
EPA 8321A CARB	Methiocarb	<RL	17	17	100.00
EPA 8321A CARB	Methomyl	<RL	17	17	100.00
EPA 8321A CARB	Oxamyl	<RL	17	17	100.00
EPA 8321A CARB	Diuron	<RL	17	17	100.00
EPA 8321A CARB	Linuron	<RL	17	17	100.00
EPA 619	Atrazine	<RL	17	17	100.00
EPA 619	Cyanazine	<RL	17	17	100.00
EPA 619	Simazine	<RL	17	17	100.00
EPA 547M	Glyphosate	<RL	8	8	100.00
EPA 549.2M	Paraquat dichloride	<RL	8	8	100.00
EPA 8081A	DDD(p,p')	<RL	10	10	100.00
EPA 8081A	DDE(p,p')	<RL	10	10	100.00
EPA 8081A	DDT(p,p')	<RL	10	10	100.00
EPA 8081A	Dicofol	<RL	10	10	100.00
EPA 8081A	Dieldrin	<RL	10	10	100.00
EPA 8081A	Endrin	<RL	10	10	100.00
EPA 8081A	Methoxychlor	<RL	10	10	100.00
EPA 8081A	Aldrin	<RL	10	10	100.00
EPA 8081A	Chlordane	<RL	10	10	100.00
EPA 8081A	Heptachlor	<RL	10	10	100.00
EPA 8081A	Heptachlor epoxide	<RL	10	10	100.00
EPA 8081A	HCH, alpha	<RL	10	10	100.00
EPA 8081A	HCH, beta	<RL	10	10	100.00
EPA 8081A	HCH, delta	<RL	10	10	100.00
EPA 8081A	HCH, gamma	<RL	10	10	100.00
EPA 8081A	Endosulfan I	<RL	10	10	100.00
EPA 8081A	Endosulfan II	<RL	10	10	100.00
EPA 8081A	Toxaphene	<RL	10	10	100.00
EPA 8141A OP	Azinphos methyl	<RL	17	17	100.00
EPA 8141A OP	Chlorpyrifos	<RL	17	17	100.00
EPA 8141A OP	Diazinon	<RL	17	17	100.00
EPA 8141A OP	Dichlorvos	<RL	17	17	100.00
EPA 8141A OP	Dimethoate	<RL	17	17	100.00
EPA 8141A OP	Demeton-s	<RL	17	17	100.00
EPA 8141A OP	Disulfoton	<RL	17	17	100.00
EPA 8141A OP	Malathion	<RL	17	17	100.00
EPA 8141A OP	Methidathion	<RL	17	17	100.00
EPA 8141A OP	Parathion, Methyl	<RL	17	17	100.00
EPA 8141A OP	Phorate	<RL	17	17	100.00
EPA 8141A OP	Phosmet	<RL	17	17	100.00
EPA 8141A OP	Trifluralin	<RL	17	17	100.00
EPA 8321A	Methamidophos	<RL	17	17	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	<RL	19	19	100.00
EPA 160.1	Total Dissolved Solids	<RL	18	18	100.00
EPA 160.2	Total Suspended Solids	<RL	19	19	100.00
EPA 180.1	Turbidity	<RL	17	17	100.00
EPA 350.2	Ammonia as N	<RL	18	18	100.00
EPA 351.3	Nitrogen, Total Kjeldahl	<RL	23	22	95.65
EPA 353.2	Nitrate + Nitrite as N	<RL	22	22	100.00
EPA 365.2	OrthoPhosphate as P	<RL	17	17	100.00
EPA 365.2	Phosphate as P	<RL	17	17	100.00
EPA 415.1	Total Organic Carbon	<RL	18	18	100.00

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
SM 9223B	*E. coli*	<RL	17	17	100.00
EPA 200.8	Arsenic	<RL	12	12	100.00
EPA 200.8	Boron	<RL	17	17	100.00
EPA 200.8	Cadmium	<RL	12	12	100.00
EPA 200.8	Copper	<RL	18	18	100.00
EPA 200.8	Lead	<RL	13	13	100.00
EPA 200.8	Molybdenum	<RL	12	12	100.00
EPA 200.8	Nickel	<RL	18	18	100.00
EPA 200.8	Selenium	<RL	16	16	100.00
EPA 200.8	Zinc	<RL	17	17	100.00
EPA 200.8	Cadmium (Dissolved)	<RL	12	12	100.00
EPA 200.8	Copper (Dissolved)	<RL	18	18	100.00
EPA 200.8	Lead (Dissolved)	<RL	13	13	100.00
EPA 200.8	Nickel (Dissolved)	<RL	17	17	100.00
EPA 200.8	Zinc (Dissolved)	<RL	17	17	100.00
Walkley-Black	Total Organic Carbon (sediment)	<RL	3	3	100.00
EPA 8270M_NCI	Bifenthrin (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Chlorpyrifos (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Cyfluthrin (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Cypermethrin (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Fenpropathrin (sediment)	<RL	1	1	100.00
EPA 8270M_NCI	Permethrin (sediment)	<RL	1	1	100.00
		TOTAL	**1051**	**1050**	**99.90**

Table 22. ESJWQC summary of LCS Quality Control sample evaluations.

Laboratory control spikes and laboratory control spike duplicates analyzed in batches with samples collected from January through December 2011, sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	PR 31-133	17	17	100.00
EPA 8321A CARB	Carbaryl	PR 44-133	17	17	100.00
EPA 8321A CARB	Carbofuran	PR 36-165	18	18	100.00
EPA 8321A CARB	Methiocarb	PR 35-142	17	17	100.00
EPA 8321A CARB	Methomyl	PR 23-152	17	17	100.00
EPA 8321A CARB	Oxamyl	PR 10-117	17	17	100.00
EPA 8321A CARB	Diuron	PR 52-136	17	17	100.00
EPA 8321A CARB	Linuron	PR 49-144	17	17	100.00
EPA 619	Atrazine	PR 39-156	18	18	100.00
EPA 619	Cyanazine	PR 22-172	18	18	100.00
EPA 619	Simazine	PR 21-179	18	18	100.00
EPA 547M	Glyphosate	PR 84-113	16	16	100.00
EPA 549.2M	Paraquat dichloride	PR 70-130	16	15	93.75
EPA 8081A	DDD(p,p')	PR 38-135	10	10	100.00
EPA 8081A	DDE(p,p')	PR 21-134	10	10	100.00
EPA 8081A	DDT(p,p')	PR 18-145	10	10	100.00
EPA 8081A	Dicofol	PR 40-135	10	10	100.00
EPA 8081A	Dieldrin	PR 48-121	10	10	100.00
EPA 8081A	Endrin	PR 24-143	10	10	100.00
EPA 8081A	Methoxychlor	PR 30-163	10	10	100.00
EPA 8081A	Aldrin	PR 11-138	10	10	100.00
EPA 8081A	Chlordane	PR 44-152	10	10	100.00
EPA 8081A	Heptachlor	PR 24-124	10	10	100.00
EPA 8081A	Heptachlor epoxide	PR 58-109	10	10	100.00
EPA 8081A	HCH, alpha	PR 33-111	10	10	100.00
EPA 8081A	HCH, beta	PR 49-119	10	10	100.00
EPA 8081A	HCH, delta	PR 12-97	10	10	100.00
EPA 8081A	HCH, gamma	PR 40-114	10	10	100.00
EPA 8081A	Endosulfan I	PR 50-131	10	10	100.00
EPA 8081A	Endosulfan II	PR 55-128	10	10	100.00
EPA 8081A	Toxaphene	PR 23-140	10	10	100.00
EPA 8141A OP	Azinphos methyl	PR 36-189	18	18	100.00
EPA 8141A OP	Chlorpyrifos	PR 61-125	18	18	100.00
EPA 8141A OP	Diazinon	PR 57-130	18	18	100.00
EPA 8141A OP	Dichlorvos	PR 10-175	18	18	100.00
EPA 8141A OP	Dimethoate	PR 68-202	18	16	88.89
EPA 8141A OP	Demeton-s	PR 40-125	18	18	100.00
EPA 8141A OP	Disulfoton	PR 47-117	18	18	100.00
EPA 8141A OP	Malathion	PR 47-125	18	18	100.00
EPA 8141A OP	Methidathion	PR 50-150	18	18	100.00
EPA 8141A OP	Parathion, Methyl	PR 55-164	18	18	100.00
EPA 8141A OP	Phorate	PR 44-117	18	18	100.00
EPA 8141A OP	Phosmet	PR 50-150	18	18	100.00
EPA 8141A OP	Trifluralin	PR 40-148	18	18	100.00
EPA 8321A	Methamidophos	PR 25-136	17	15	88.24
SM 2340 C	Hardness as CaCO3 (Dissolved)	PR 80-120	19	19	100.00
EPA 160.1	Total Dissolved Solids	PR 80-120	17	17	100.00
EPA 160.2	Total Suspended Solids	PR 80-120	19	19	100.00
EPA 180.1	Turbidity	PR 90-110	17	17	100.00
EPA 350.2	Ammonia as N	PR 90-110	18	18	100.00
EPA 351.3	Nitrogen, Total Kjeldahl	PR 90-110	24	24	100.00
EPA 353.2	Nitrate + Nitrite as N	PR 90-110	22	22	100.00
EPA 365.2	OrthoPhosphate as P	PR 90-110	17	17	100.00
EPA 365.2	Phosphate as P	PR 90-110	17	17	100.00

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 415.1	Total Organic Carbon	PR 80-120	18	18	100.00
SM 9223	*E. coli*	NA			NA
EPA 200.8	Arsenic	PR 85-115	17	17	100.00
EPA 200.8	Boron	PR 85-115	22	22	100.00
EPA 200.8	Cadmium	PR 85-115	17	17	100.00
EPA 200.8	Copper	PR 85-115	23	23	100.00
EPA 200.8	Lead	PR 85-115	18	18	100.00
EPA 200.8	Molybdenum	PR 85-115	17	17	100.00
EPA 200.8	Nickel	PR 85-115	23	23	100.00
EPA 200.8	Selenium	PR 85-115	21	21	100.00
EPA 200.8	Zinc	PR 85-115	22	22	100.00
EPA 200.8	Cadmium (Dissolved)	PR 85-115	19	19	100.00
EPA 200.8	Copper (Dissolved)	PR 85-115	25	25	100.00
EPA 200.8	Lead (Dissolved)	PR 85-115	20	20	100.00
EPA 200.8	Nickel (Dissolved)	PR 85-115	24	24	100.00
EPA 200.8	Zinc (Dissolved)	PR 85-115	24	24	100.00
Walkley-Black	Total Organic Carbon (sediment)	PR 75-125	3	3	100.00
EPA 8270M_NCI	Bifenthrin (sediment)	PR 50-150	2	2	100.00
EPA 8270M_NCI	Chlorpyrifos (sediment)	PR 50-150	2	2	100.00
EPA 8270M_NCI	Cyfluthrin (sediment)	PR 50-150	2	2	100.00
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	PR 50-150	2	2	100.00
EPA 8270M_NCI	Cypermethrin (sediment)	PR 50-150	2	2	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	PR 50-150	2	2	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	PR 50-150	2	2	100.00
EPA 8270M_NCI	Fenpropathrin (sediment)	PR 50-200	2	2	100.00
EPA 8270M_NCI	Permethrin (sediment)	PR 50-150	2	2	100.00
		TOTAL	**1155**	**1150**	**99.57**

NA-Not applicable

Table 23. ESJWQC summary of LCSD Quality Control sample evaluations.

Laboratory control spike duplicates analyzed in batches with samples collected from January through December 2011, sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Pairs	Pairs Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	RPD ≤ 25			NA
EPA 8321A CARB	Carbaryl	RPD ≤ 25			NA
EPA 8321A CARB	Carbofuran	RPD ≤ 25			NA
EPA 8321A CARB	Methiocarb	RPD ≤ 25			NA
EPA 8321A CARB	Methomyl	RPD ≤ 25			NA
EPA 8321A CARB	Oxamyl	RPD ≤ 25			NA
EPA 8321A CARB	Diuron	RPD ≤ 25			NA
EPA 8321A CARB	Linuron	RPD ≤ 25			NA
EPA 619	Atrazine	RPD ≤ 25	1	1	100.00
EPA 619	Cyanazine	RPD ≤ 25	1	1	100.00
EPA 619	Simazine	RPD ≤ 25	1	1	100.00
EPA 547M	Glyphosate	RPD ≤ 25	8	8	100.00
EPA 549.2M	Paraquat dichloride	RPD ≤ 25	8	8	100.00
EPA 8081A	DDD(p,p')	RPD ≤ 25			NA
EPA 8081A	DDE(p,p')	RPD ≤ 25			NA
EPA 8081A	DDT(p,p')	RPD ≤ 25			NA
EPA 8081A	Dicofol	RPD ≤ 25			NA
EPA 8081A	Dieldrin	RPD ≤ 25			NA
EPA 8081A	Endrin	RPD ≤ 25			NA
EPA 8081A	Methoxychlor	RPD ≤ 25			NA
EPA 8081A	Aldrin	RPD ≤ 25			NA
EPA 8081A	Chlordane	RPD ≤ 25			NA
EPA 8081A	Heptachlor	RPD ≤ 25			NA
EPA 8081A	Heptachlor epoxide	RPD ≤ 25			NA
EPA 8081A	HCH, alpha	RPD ≤ 25			NA
EPA 8081A	HCH, beta	RPD ≤ 25			NA
EPA 8081A	HCH, delta	RPD ≤ 25			NA
EPA 8081A	HCH, gamma	RPD ≤ 25			NA
EPA 8081A	Endosulfan I	RPD ≤ 25			NA
EPA 8081A	Endosulfan II	RPD ≤ 25			NA
EPA 8081A	Toxaphene	RPD ≤ 25			NA
EPA 8141A OP	Azinphos methyl	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Chlorpyrifos	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Diazinon	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Dichlorvos	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Dimethoate	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Demeton-s	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Disulfoton	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Malathion	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Methidathion	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Parathion, Methyl	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Phorate	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Phosmet	RPD ≤ 25	1	1	100.00
EPA 8141A OP	Trifluralin	RPD ≤ 25	1	1	100.00
EPA 8321A	Methamidophos	RPD ≤ 25			NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20			NA
EPA 160.1	Total Dissolved Solids	RPD ≤ 25			NA
EPA 160.2	Total Suspended Solids	RPD ≤ 20			NA
EPA 180.1	Turbidity	RPD ≤ 20			NA
EPA 350.2	Ammonia as N	RPD ≤ 20			NA
EPA 351.3	Nitrogen, Total Kjeldahl	RPD ≤ 20	1	1	100.00
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20			NA
EPA 365.2	OrthoPhosphate as P	RPD ≤ 25			NA
EPA 365.2	Phosphate as P	RPD ≤ 20			NA

Method	Analyte	Data Quality Objective	Number of Pairs	Pairs Within Control Limits	Percent Samples Acceptable
EPA 415.1	Total Organic Carbon	RPD ≤ 20			NA
SM 9223B	*E. coli*	NA			NA
EPA 200.8	Arsenic	RPD ≤ 20	5	5	100.00
EPA 200.8	Boron	RPD ≤ 20	5	5	100.00
EPA 200.8	Cadmium	RPD ≤ 20	5	5	100.00
EPA 200.8	Copper	RPD ≤ 20	5	5	100.00
EPA 200.8	Lead	RPD ≤ 20	5	5	100.00
EPA 200.8	Molybdenum	RPD ≤ 20	5	5	100.00
EPA 200.8	Nickel	RPD ≤ 20	5	5	100.00
EPA 200.8	Selenium	RPD ≤ 20	5	5	100.00
EPA 200.8	Zinc	RPD ≤ 20	5	5	100.00
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	7	7	100.00
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	7	7	100.00
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	7	7	100.00
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	7	7	100.00
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	7	7	100.00
Walkley-Black	Total Organic Carbon (sediment)	RSD ≤ 20			NA
EPA 8270M_NCI	Bifenthrin (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Chlorpyrifos (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Cyfluthrin (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Cypermethrin (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Fenpropathrin (sediment)	RPD ≤ 25	1	1	100.00
EPA 8270M_NCI	Permethrin (sediment)	RPD ≤ 25	1	1	100.00
		TOTAL	**122**	**122**	**100.00**

NA-Not applicable

Table 24. ESJWQC summary of matrix spike Quality Control sample evaluations.

Matrix spikes and matrix spike duplicates collected from January through December 2011. Non project matrix spikes are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	PR 31-133	34	34	100.00
EPA 8321A CARB	Carbaryl	PR 44-133	34	33	97.06
EPA 8321A CARB	Carbofuran	PR 36-165	34	34	100.00
EPA 8321A CARB	Methiocarb	PR 35-142	34	34	100.00
EPA 8321A CARB	Methomyl	PR 23-152	34	34	100.00
EPA 8321A CARB	Oxamyl	PR 10-117	34	34	100.00
EPA 8321A CARB	Diuron	PR 52-136	34	34	100.00
EPA 8321A CARB	Linuron	PR 49-144	34	34	100.00
EPA 619	Atrazine	PR 39-156	34	33	97.06
EPA 619	Cyanazine	PR 22-172	34	34	100.00
EPA 619	Simazine	PR 21-179	34	34	100.00
EPA 547M	Glyphosate	PR 84-113	18	18	100.00
EPA 549.2M	Paraquat dichloride	PR 70-130	18	8	44.44
EPA 8081A	DDD(p,p')	PR 38-135	20	20	100.00
EPA 8081A	DDE(p,p')	PR 21-134	20	20	100.00
EPA 8081A	DDT(p,p')	PR 18-145	20	20	100.00
EPA 8081A	Dicofol	PR 40-135	20	20	100.00
EPA 8081A	Dieldrin	PR 48-121	20	20	100.00
EPA 8081A	Endrin	PR 24-143	20	20	100.00
EPA 8081A	Methoxychlor	PR 30-163	20	20	100.00
EPA 8081A	Aldrin	PR 11-138	20	20	100.00
EPA 8081A	Chlordane	PR 44-152	20	20	100.00
EPA 8081A	Heptachlor	PR 24-124	20	20	100.00
EPA 8081A	Heptachlor epoxide	PR 58-109	20	20	100.00
EPA 8081A	HCH, alpha	PR 33-111	20	20	100.00
EPA 8081A	HCH, beta	PR 49-119	20	20	100.00
EPA 8081A	HCH, delta	PR 12-97	20	20	100.00
EPA 8081A	HCH, gamma	PR 40-114	20	20	100.00
EPA 8081A	Endosulfan I	PR 50-131	20	20	100.00
EPA 8081A	Endosulfan II	PR 55-128	20	20	100.00
EPA 8081A	Toxaphene	PR 23-140	20	20	100.00
EPA 8141A OP	Azinphos methyl	PR 36-189	34	34	100.00
EPA 8141A OP	Chlorpyrifos	PR 61-125	34	31	91.18
EPA 8141A OP	Diazinon	PR 57-130	34	31	91.18
EPA 8141A OP	Dichlorvos	PR 10-175	34	34	100.00
EPA 8141A OP	Dimethoate	PR 68-202	34	29	85.29
EPA 8141A OP	Demeton-s	PR 40-125	34	33	97.06
EPA 8141A OP	Disulfoton	PR 47-117	34	34	100.00
EPA 8141A OP	Malathion	PR 47-125	34	34	100.00
EPA 8141A OP	Methidathion	PR 50-150	34	33	97.06
EPA 8141A OP	Parathion, Methyl	PR 55-164	34	34	100.00
EPA 8141A OP	Phorate	PR 44-117	34	34	100.00
EPA 8141A OP	Phosmet	PR 50-150	34	32	94.12
EPA 8141A OP	Trifluralin	PR 40-148	34	33	97.06
EPA 8321A	Methamidophos	PR 25-136	34	34	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	PR 80-120	38	32	84.21
EPA 160.1	Total Dissolved Solids	PR 80-120			NA
EPA 160.2	Total Suspended Solids	PR 80-120			NA
EPA 180.1	Turbidity	PR 90-110			NA
EPA 350.2	Ammonia as N	PR 90-110	36	36	100.00
EPA 351.3	Nitrogen, Total Kjeldahl	PR 90-110	44	41	93.18
EPA 353.2	Nitrate + Nitrite as N	PR 90-110	44	40	90.91
EPA 365.2	OrthoPhosphate as P	PR 90-110	34	34	100.00
EPA 365.2	Phosphate as P	PR 90-110	34	34	100.00

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 415.1	Total Organic Carbon	PR 80-120	36	36	100.00
SM 9223B	*E. coli*	NA			NA
EPA 200.8	Arsenic	PR 70-130	26	26	100.00
EPA 200.8	Boron	PR 70-130	36	34	94.44
EPA 200.8	Cadmium	PR 70-130	26	26	100.00
EPA 200.8	Copper	PR 70-130	38	38	100.00
EPA 200.8	Lead	PR 70-130	28	28	100.00
EPA 200.8	Molybdenum	PR 70-130	26	25	96.15
EPA 200.8	Nickel	PR 70-130	38	38	100.00
EPA 200.8	Selenium	PR 70-130	34	34	100.00
EPA 200.8	Zinc	PR 70-130	36	35	97.22
EPA 200.8	Cadmium (Dissolved)	PR 70-130	24	24	100.00
EPA 200.8	Copper (Dissolved)	PR 70-130	36	36	100.00
EPA 200.8	Lead (Dissolved)	PR 70-130	26	26	100.00
EPA 200.8	Nickel (Dissolved)	PR 70-130	34	34	100.00
EPA 200.8	Zinc (Dissolved)	PR 70-130	34	34	100.00
Walkley-Black	Total Organic Carbon (sediment)	PR 75-125	6	6	100.00
EPA 8270M_NCI	Bifenthrin (sediment)	PR 25-200	1	1	100.00
EPA 8270M_NCI	Chlorpyrifos (sediment)	PR 40-130	1	1	100.00
EPA 8270M_NCI	Cyfluthrin (sediment)	PR 50-150	1	1	100.00
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	PR 30-160	1	1	100.00
EPA 8270M_NCI	Cypermethrin (sediment)	PR 50-150	1	1	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	PR 35-150	1	1	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	PR 50-175	1	1	100.00
EPA 8270M_NCI	Fenpropathrin (sediment)	PR 50-200	1	1	100.00
EPA 8270M_NCI	Permethrin (sediment)	PR 40-200	1	1	100.00
		TOTAL	**1969**	**1924**	**97.71**

NA-Not applicable

Table 25. ESJWQC summary of matrix spike duplicate Quality Control sample evaluations.

Matrix spike duplicates collected from January through December 2011. Non project matrix spike duplicates are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Pairs	Pairs Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	RPD ≤ 25	17	16	94.12
EPA 8321A CARB	Carbaryl	RPD ≤ 25	17	16	94.12
EPA 8321A CARB	Carbofuran	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Methiocarb	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Methomyl	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Oxamyl	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Diuron	RPD ≤ 25	17	17	100.00
EPA 8321A CARB	Linuron	RPD ≤ 25	17	17	100.00
EPA 619	Atrazine	RPD ≤ 25	17	16	94.12
EPA 619	Cyanazine	RPD ≤ 25	17	16	94.12
EPA 619	Simazine	RPD ≤ 25	17	16	94.12
EPA 547M	Glyphosate	RPD ≤ 25	9	9	100.00
EPA 549.2M	Paraquat dichloride	RPD ≤ 25	9	7	77.78
EPA 8081A	DDD(p,p')	RPD ≤ 25	10	10	100.00
EPA 8081A	DDE(p,p')	RPD ≤ 25	10	10	100.00
EPA 8081A	DDT(p,p')	RPD ≤ 25	10	10	100.00
EPA 8081A	Dicofol	RPD ≤ 25	10	10	100.00
EPA 8081A	Dieldrin	RPD ≤ 25	10	10	100.00
EPA 8081A	Endrin	RPD ≤ 25	10	10	100.00
EPA 8081A	Methoxychlor	RPD ≤ 25	10	10	100.00
EPA 8081A	Aldrin	RPD ≤ 25	10	10	100.00
EPA 8081A	Chlordane	RPD ≤ 25	10	10	100.00
EPA 8081A	Heptachlor	RPD ≤ 25	10	10	100.00
EPA 8081A	Heptachlor epoxide	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, alpha	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, beta	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, delta	RPD ≤ 25	10	10	100.00
EPA 8081A	HCH, gamma	RPD ≤ 25	10	10	100.00
EPA 8081A	Endosulfan I	RPD ≤ 25	10	10	100.00
EPA 8081A	Endosulfan II	RPD ≤ 25	10	10	100.00
EPA 8081A	Toxaphene	RPD ≤ 25	10	10	100.00
EPA 8141A OP	Azinphos methyl	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Chlorpyrifos	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Diazinon	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Dichlorvos	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Dimethoate	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Demeton-s	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Disulfoton	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Malathion	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Methidathion	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Parathion, Methyl	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Phorate	RPD ≤ 25	17	16	94.12
EPA 8141A OP	Phosmet	RPD ≤ 25	17	15	88.24
EPA 8141A OP	Trifluralin	RPD ≤ 25	17	16	94.12
EPA 8321A	Methamidophos	RPD ≤ 25	17	14	82.35
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	19	19	100.00
EPA 160.1	Total Dissolved Solids	RPD ≤ 25			NA
EPA 160.2	Total Suspended Solids	RPD ≤ 20			NA
EPA 180.1	Turbidity	RPD ≤ 20			NA
EPA 350.2	Ammonia as N	RPD ≤ 20	18	18	100.00
EPA 351.3	Nitrogen, Total Kjeldahl	RPD ≤ 20	22	21	95.45
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	22	22	100.00
EPA 365.2	OrthoPhosphate as P	RPD ≤ 20	17	17	100.00
EPA 365.2	Phosphate as P	RPD ≤ 20	17	17	100.00

Method	Analyte	Data Quality Objective	Number of Pairs	Pairs Within Control Limits	Percent Samples Acceptable
EPA 415.1	Total Organic Carbon	RPD ≤ 20	18	18	100.00
SM 9223B	*E. coli*	NA			NA
EPA 200.8	Arsenic	RPD ≤ 20	13	13	100.00
EPA 200.8	Boron	RPD ≤ 20	18	18	100.00
EPA 200.8	Cadmium	RPD ≤ 20	13	13	100.00
EPA 200.8	Copper	RPD ≤ 20	19	19	100.00
EPA 200.8	Lead	RPD ≤ 20	14	14	100.00
EPA 200.8	Molybdenum	RPD ≤ 20	13	13	100.00
EPA 200.8	Nickel	RPD ≤ 20	19	19	100.00
EPA 200.8	Selenium	RPD ≤ 20	17	17	100.00
EPA 200.8	Zinc	RPD ≤ 20	18	18	100.00
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	12	12	100.00
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	18	18	100.00
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	13	13	100.00
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	17	17	100.00
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	17	17	100.00
Walkley-Black	Total Organic Carbon (sediment)	RSD ≤ 20	3	3	100.00
EPA 8270M_NCI	Bifenthrin (sediment)	RPD <25			NA
EPA 8270M_NCI	Chlorpyrifos (sediment)	RPD <25			NA
EPA 8270M_NCI	Cyfluthrin (sediment)	RPD <25			NA
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	RPD <25			NA
EPA 8270M_NCI	Cypermethrin (sediment)	RPD <25			NA
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	RPD <25			NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	RPD <25			NA
EPA 8270M_NCI	Fenpropathrin (sediment)	RPD <25			NA
EPA 8270M_NCI	Permethrin (sediment)	RPD <25			NA
		TOTAL	**980**	**955**	**97.45**

NA-Not applicable

Table 26. ESJWQC summary of lab duplicate Quality Control sample evaluations.

Lab duplicates were analyzed in batches with samples collected January through December 2011. Non project samples are included for batch Quality Assurance completeness purposes. Evaluations sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	RPD ≤ 25			NA
EPA 8321A CARB	Carbaryl	RPD ≤ 25			NA
EPA 8321A CARB	Carbofuran	RPD ≤ 25			NA
EPA 8321A CARB	Methiocarb	RPD ≤ 25			NA
EPA 8321A CARB	Methomyl	RPD ≤ 25			NA
EPA 8321A CARB	Oxamyl	RPD ≤ 25			NA
EPA 8321A CARB	Diuron	RPD ≤ 25			NA
EPA 8321A CARB	Linuron	RPD ≤ 25			NA
EPA 619	Atrazine	RPD ≤ 25			NA
EPA 619	Cyanazine	RPD ≤ 25			NA
EPA 619	Simazine	RPD ≤ 25			NA
EPA 547M	Glyphosate	RPD ≤ 25			NA
EPA 549.2M	Paraquat dichloride	RPD ≤ 25			NA
EPA 8081A	DDD(p,p')	RPD ≤ 25			NA
EPA 8081A	DDE(p,p')	RPD ≤ 25			NA
EPA 8081A	DDT(p,p')	RPD ≤ 25			NA
EPA 8081A	Dicofol	RPD ≤ 25			NA
EPA 8081A	Dieldrin	RPD ≤ 25			NA
EPA 8081A	Endrin	RPD ≤ 25			NA
EPA 8081A	Methoxychlor	RPD ≤ 25			NA
EPA 8081A	Aldrin	RPD ≤ 25			NA
EPA 8081A	Chlordane	RPD ≤ 25			NA
EPA 8081A	Heptachlor	RPD ≤ 25			NA
EPA 8081A	Heptachlor epoxide	RPD ≤ 25			NA
EPA 8081A	HCH, alpha	RPD ≤ 25			NA
EPA 8081A	HCH, beta	RPD ≤ 25			NA
EPA 8081A	HCH, delta	RPD ≤ 25			NA
EPA 8081A	HCH, gamma	RPD ≤ 25			NA
EPA 8081A	Endosulfan I	RPD ≤ 25			NA
EPA 8081A	Endosulfan II	RPD ≤ 25			NA
EPA 8081A	Toxaphene	RPD ≤ 25			NA
EPA 8141A OP	Azinphos methyl	RPD ≤ 25			NA
EPA 8141A OP	Chlorpyrifos	RPD ≤ 25			NA
EPA 8141A OP	Diazinon	RPD ≤ 25			NA
EPA 8141A OP	Dichlorvos	RPD ≤ 25			NA
EPA 8141A OP	Dimethoate	RPD ≤ 25			NA
EPA 8141A OP	Demeton-s	RPD ≤ 25			NA
EPA 8141A OP	Disulfoton	RPD ≤ 25			NA
EPA 8141A OP	Malathion	RPD ≤ 25			NA
EPA 8141A OP	Methidathion	RPD ≤ 25			NA
EPA 8141A OP	Parathion, Methyl	RPD ≤ 25			NA
EPA 8141A OP	Phorate	RPD ≤ 25			NA
EPA 8141A OP	Phosmet	RPD ≤ 25			NA
EPA 8141A OP	Trifluralin	RPD ≤ 25			NA
EPA 8321A	Methamidophos	RPD ≤ 25			NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 25			NA
EPA 160.1	Total Dissolved Solids	RPD ≤ 25	22	20	90.91
EPA 160.2	Total Suspended Solids	RPD ≤ 25	24	23	95.83
EPA 180.1	Turbidity	RPD ≤ 25	17	17	100.00
EPA 350.2	Ammonia as N	RPD ≤ 25			NA
EPA 351.3	Nitrogen, Total Kjeldahl	RPD ≤ 25			NA
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 25			NA
EPA 365.2	OrthoPhosphate as P	RPD ≤ 25			NA
EPA 365.2	Phosphate as P	RPD ≤ 25			NA

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 415.1	Total Organic Carbon	RPD ≤ 25			NA
SM 9223B	*E. coli*	Rlog ≤ 1.3	17	17	100.00
EPA 200.8	Arsenic	RPD ≤ 25			NA
EPA 200.8	Boron	RPD ≤ 25			NA
EPA 200.8	Cadmium	RPD ≤ 25			NA
EPA 200.8	Copper	RPD ≤ 25			NA
EPA 200.8	Lead	RPD ≤ 25			NA
EPA 200.8	Molybdenum	RPD ≤ 25			NA
EPA 200.8	Nickel	RPD ≤ 25			NA
EPA 200.8	Selenium	RPD ≤ 25			NA
EPA 200.8	Zinc	RPD ≤ 25			NA
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 25			NA
EPA 200.8	Copper (Dissolved)	RPD ≤ 25			NA
EPA 200.8	Lead (Dissolved)	RPD ≤ 25			NA
EPA 200.8	Nickel (Dissolved)	RPD ≤ 25			NA
EPA 200.8	Zinc (Dissolved)	RPD ≤ 25			NA
Walkley-Black	Total Organic Carbon (sediment)	RSD ≤ 20			NA
EPA 8270M_NCI	Bifenthrin (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Chlorpyrifos (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Cyfluthrin (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Cypermethrin (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Fenpropathrin (sediment)	RPD ≤ 25			NA
EPA 8270M_NCI	Permethrin (sediment)	RPD ≤ 25			NA
		TOTAL	**80**	**77**	**96.25**

NA-Not applicable

Table 27. ESJWQC summary of surrogate recovery Quality Control sample evaluations.

Surrogates were run with water samples collected and Laboratory Quality Assurance (LABQA) analyzed from January through December 2011 for all organics except paraquat and glyphosate. Non project samples are included for batch Quality Assurance purposes. Evaluation sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Tributylphosphate(Surrogate)	RPD ≤ 25; PR 36-140	238	238	100.00
EPA 8321A	Diphenamid(Surrogate)	RPD ≤ 25; PR 52-122	233	215	92.27
EPA 619	Tributylphosphate(Surrogate)	RPD ≤ 25; PR 62-145	234	224	95.73
EPA 619	Triphenyl phosphate(Surrogate)	RPD ≤ 25; PR 54-144	234	228	97.44
EPA 8081A	Decachlorobiphenyl(Surrogate)	RPD ≤ 25; PR 16-146	138	138	100.00
EPA 8081A	Tetrachloro-m-xylene(Surrogate)	RPD ≤ 25; PR 15-98	138	138	100.00
EPA 8141A OP	Tributylphosphate(Surrogate)	RPD ≤ 25; PR 60-150	248	240	96.77
EPA 8141A OP	Triphenyl phosphate(Surrogate)	RPD ≤ 25; PR 56-129	248	240	96.77
EPA 8270M_NCI	Decachlorobiphenyl(Surrogate) sediment	RPD ≤ 25; PR 50-150 (MS), PR 76-172 (LCS)	6	6	100.00
		TOTAL	**1717**	**1667**	**97.09**

Table 28. ESJWQC summary of holding time evaluations for environmental, field blank, field duplicate and matrix spike samples.

Samples collected from January through December 2011; sorted by method and analyte.

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 8321A CARB	Aldicarb	7 days	182	182	100.00
EPA 8321A CARB	Carbaryl	7 days	182	182	100.00
EPA 8321A CARB	Carbofuran	7 days	183	182	99.45
EPA 8321A CARB	Methiocarb	7 days	182	182	100.00
EPA 8321A CARB	Methomyl	7 days	182	182	100.00
EPA 8321A CARB	Oxamyl	7 days	182	182	100.00
EPA 8321A CARB	Diuron	7 days	184	184	100.00
EPA 8321A CARB	Linuron	7 days	182	182	100.00
EPA 619	Atrazine	7 days	182	182	100.00
EPA 619	Cyanazine	7 days	182	182	100.00
EPA 619	Simazine	7 days	182	182	100.00
EPA 547M	Glyphosate	14 days	96	96	100.00
EPA 549.2M	Paraquat dichloride	7 days	96	96	100.00
EPA 8081A	DDD(p,p')	7 days	108	108	100.00
EPA 8081A	DDE(p,p')	7 days	108	108	100.00
EPA 8081A	DDT(p,p')	7 days	108	108	100.00
EPA 8081A	Dicofol	7 days	108	108	100.00
EPA 8081A	Dieldrin	7 days	108	108	100.00
EPA 8081A	Endrin	7 days	108	108	100.00
EPA 8081A	Methoxychlor	7 days	108	108	100.00
EPA 8081A	Aldrin	7 days	108	108	100.00
EPA 8081A	Chlordane	7 days	108	108	100.00
EPA 8081A	Heptachlor	7 days	108	108	100.00
EPA 8081A	Heptachlor epoxide	7 days	108	108	100.00
EPA 8081A	HCH, alpha	7 days	108	108	100.00
EPA 8081A	HCH, beta	7 days	108	108	100.00
EPA 8081A	HCH, delta	7 days	108	108	100.00
EPA 8081A	HCH, gamma	7 days	108	108	100.00
EPA 8081A	Endosulfan I	7 days	108	108	100.00
EPA 8081A	Endosulfan II	7 days	108	108	100.00
EPA 8081A	Toxaphene	7 days	108	108	100.00
EPA 8141A OP	Azinphos methyl	7 days	182	182	100.00
EPA 8141A OP	Chlorpyrifos	7 days	196	196	100.00
EPA 8141A OP	Diazinon	7 days	183	183	100.00
EPA 8141A OP	Dichlorvos	7 days	182	182	100.00
EPA 8141A OP	Dimethoate	7 days	182	182	100.00
EPA 8141A OP	Demeton-s	7 days	182	182	100.00
EPA 8141A OP	Disulfoton	7 days	182	182	100.00
EPA 8141A OP	Malathion	7 days	182	182	100.00
EPA 8141A OP	Methidathion	7 days	182	182	100.00
EPA 8141A OP	Parathion, Methyl	7 days	182	182	100.00
EPA 8141A OP	Phorate	7 days	182	182	100.00
EPA 8141A OP	Phosmet	7 days	182	182	100.00
EPA 8141A OP	Trifluralin	7 days	182	182	100.00
EPA 8321A	Methamidophos	7 days	182	182	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	6 months	209	209	100.00
EPA 160.1	Total Dissolved Solids	7 days	165	165	100.00
EPA 160.2	Total Suspended Solids	7 days	165	165	100.00
EPA 180.1	Turbidity	48 hours	165	165	100.00
EPA 350.2	Ammonia as N	Field acidify, 28 days	182	182	100.00
EPA 351.3	Nitrogen, Total Kjeldahl	Field acidify, 28 days	179	179	100.00
EPA 353.2	Nitrate + Nitrite as N	Field acidify, 28 days	185	168	90.81
EPA 365.2	OrthoPhosphate as P	48 hours	182	182	100.00

Method	Analyte	Data Quality Objective	Number of Samples	Samples Within Control Limits	Percent Samples Acceptable
EPA 365.2	Phosphate as P	Field acidify, 28 days	182	182	100.00
EPA 415.1	Total Organic Carbon	28 days	183	183	100.00
SM 9223B	*E. coli*	24 hours	165	165	100.00
EPA 200.8	Arsenic	Field acidify, 6 months	138	138	100.00
EPA 200.8	Boron	Field acidify, 6 months	199	199	100.00
EPA 200.8	Cadmium	Field acidify, 6 months	138	138	100.00
EPA 200.8	Copper	Field acidify, 6 months	224	224	100.00
EPA 200.8	Lead	Field acidify, 6 months	153	153	100.00
EPA 200.8	Molybdenum	Field acidify, 6 months	138	138	100.00
EPA 200.8	Nickel	Field acidify, 6 months	200	200	100.00
EPA 200.8	Selenium	Field acidify, 6 months	190	190	100.00
EPA 200.8	Zinc	Field acidify, 6 months	199	199	100.00
EPA 200.8	Cadmium (Dissolved)	Field acidify, 6 months	138	138	100.00
EPA 200.8	Copper (Dissolved)	Field acidify, 6 months	223	223	100.00
EPA 200.8	Lead (Dissolved)	Field acidify, 6 months	153	153	100.00
EPA 200.8	Nickel (Dissolved)	Field acidify, 6 months	199	199	100.00
EPA 200.8	Zinc (Dissolved)	Field acidify, 6 months	199	199	100.00
Walkley-Black	Total Organic Carbon (sediment)	Freeze within 48 hours; unfrozen 28 days	32	32	100.00
EPA 8270M_NCI	Bifenthrin (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Chlorpyrifos (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Cyfluthrin (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Cyhalothrin, lambda (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Cypermethrin (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Fenpropathrin (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
EPA 8270M_NCI	Permethrin (sediment)	Freeze within 48 hours; 12 months	3	3	100.00
		TOTAL	**11216**	**11198**	**99.84**

Table 29. ESJWQC summary of toxicity field duplicate sample evaluations.

Samples collected from January through December 2011; sorted by method and species.

Method	Toxicity Species	Total Field Duplicate Samples	Data Quality Objective (DQO)	Total Field Duplicate Samples Within DQO	Percent Samples Within Acceptable Criteria
EPA 821/R-02-012	*Ceriodaphnia dubia*	17	RPD ≤ 25	17	100.00
EPA 821/R-02-012	*Pimephales promelas*	17	RPD ≤ 25	17	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	17	RPD ≤ 25	15	88.24
EPA 600/R-99-064	*Hyalella azteca*	3	RPD ≤ 25	3	100.00

Table 30. ESJWQC summary of calculated sediment grain size RPD_{SD} results.

Batch calculations based on the relative percent difference (RPD_{SD}) between the standard deviation of the environmental samples and the standard deviation of their duplicate samples.

SAMPLE TYPE	ANALYSIS MONTH	Φ5	Φ16	Φ84	Φ95	SD	RPD_{SD}
Environmental Sample	March 2011	-0.74	-0.21	5.08	7.43	2.5	-
Lab Duplicate	March 2011	-0.24	0.1	4.04	6.97	2.1	10.5
Field Duplicate	March 2011	-0.47	0.02	4.61	7.19	2.3	10.4
Environmental Sample	September 2011 (1)	-0.34	0.21	4.75	6.52	2.17	-
Lab Duplicate	September 2011 (1)	-0.57	0.04	4.22	6.4	2.1	5.5
Field Duplicate	September 2011 (1)	-0.44	0.07	3.89	6.38	1.9	8.9
Environmental Sample	September 2011 (2)	0.15	0.86	4.95	6.6	1.99	-
Lab Duplicate	September 2011 (2)	-0.02	0.57	4.39	6.25	1.91	3.5
Field Duplicate	September 2011 (2)	0.01	0.67	4.68	6.42	1.97	1.3

Φ_{84} = phi value of the 84th percentile sediment grain size category
Φ_{16} = phi value of the 16th percentile sediment grain size category
Φ_{5} = phi value of the 5th percentile sediment grain size category
Φ_{95} = phi value of the 95th percentile sediment grain size category

DISCUSSION OF RESULTS

Sites monitored during the reporting period are listed in Table 10 of this report. Tables 4, 5 and 6 outline the constituents monitored from January through December 2011. Appendix X includes all monitoring data collected during 2011 from Lateral 3 along East Taylor Rd.

Effective July 2011, the Coalition updated its monitoring program to reflect the following changes: 1) reduced monitoring of sediment bound pesticides (glyphosate and paraquat) and organochlorines (including Group A) pesticides to one irrigation event and one storm event per year and 2) reduced monitoring of metals not applied by agriculture (arsenic, cadmium, lead, and molybdenum) to two irrigation events and two storm events per year.

Current Pesticide Use Report (PUR) data were reviewed to determine sources of Water Quality Trigger Limit (WQTL) exceedances of applied pesticides. All PUR data are considered preliminary and may contain some level of inaccuracy until they are finalized and made available through California Pesticide Information Portal (CalPIP). The most recent data available through CalPIP are through December 2010. Table 31 lists preliminary PUR data that were available for review from Madera County (January through June), Merced County (January through October) and Stanislaus County (January through September). Any outstanding PUR data that become available after this report is submitted will be included in an addendum to the AMR to be submitted on June 1, 2012.

The Coalition monitored all constituents as required in the MRP and outlined in the MRPP (Table 11, pages 69-71). With one exception, all samples collected were analyzed by the appropriate method as scheduled. Samples collected for glyphosate and paraquat during the February 17, 2011 sampling event were lost by the courier; notification from the lab of the missing samples was not received until March 25, 2011. At least 90% of samples collected during 2011 monitoring met data quality objectives for completeness, precision and accuracy. A discussion of all Quality Assurance/ Quality Control can be found in the Precision and Accuracy section of this report. All exceedances of WQTLs were reported to Regional Board staff within five business days upon receipt of lab results with one exception. An amendment to the May 10, 2011 *E. coli*, inorganics, and metals exceedance report was sent on September 15, 2011 to account for an overlooked exceedance of the ammonia WQTL. A list of all WQTL used to evaluate water quality results is included in Table 32. Coalition monitoring between January 1, 2011 and December 31, 2011 resulted in exceedances of WQTLs for DO, pH, SC, *E. coli*, TDS, ammonia, nitrates, copper, molybdenum, carbaryl, chlorpyrifos, DDT, dimethoate and diuron. Water column toxicity to *C. dubia, P. promelas* and *S. capricornutum,* and sediment toxicity to *H. azteca* also occurred.

A TIE was performed on samples where survival or growth of the respective target organism was 50% or less compared to the control. A TIE report is included in Appendix VI.

Table 31. Obtained PUR data for January through December 2011 exceedances

COUNTY	2011 PUR DATA OBTAINED	2011 PUR DATA OUTSTANDING
Madera	January through June	July through December
Merced	January through October	November through December
Stanislaus	January through November	December

Table 32. Water Quality Trigger Limits (WQTLs).

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
pH	6.5 - 8.5 units	Numeric		Sacramento/San Joaquin Rivers Basin Plan (page III.6.00)	1
Electrical Conductivity (maximum)	700 µmhos/cm	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcot)	3
Dissolved Oxygen (minimum)	7 mg/L	Numeric	Cold Freshwater Habitat, Spawning	Sacramento/San Joaquin Rivers Basin Plan. Water Quality Control Plan for the Tulare Lake Basin.	1
	5 mg/L		Warm Freshwater Habitat	Basin Plan Objective, page III-5.00: for waters designated WARM (aquatic life). Tulare Lake Basin Plan	
Turbidity	variable	Numeric	Municipal and Domestic Supply	Basin Plan Objective - increase varies based on natural turbidity	1
Total Dissolved Solids	450 mg/L	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcott)	3
Total Suspended Solids	NA				
Temperature	variable	Numeric		Basin Plan Objective (see objectives for COLD, WARM, and Enclosed Bays and Estuaries)	1
E coli	235 MPN/100 ml	Narrative	Water Contact Recreation	EPA ambient water quality criteria, single-sample maximum	3
Fecal coliform	200 MPN/100 ml **400 MPN/100 ml**	Numeric	Water Contact Recreation	Sacramento/San Joaquin Rivers Basin Plan (page III.3.00) Geometric mean of not less than five samples for any 30- day period, **nor shall more than 10% of the total number of samples taken during a 30 - day period.**	1
TOC	NA				
Pesticides – Carbamates					
Aldicarb	3 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: United States Environmental Protection Agency (USEPA) Primary Maximum Contaminant Level (MCL) (MUN, human health)	1
Carbaryl	2.53 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average	3
Carbofuran	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Prohibition	2
Methiocarb	0.5 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates	3
Methomyl	0.52 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average (California Department of Fish and Game) (aquatic life)	3
Oxamyl	50 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: Drinking Water Standards - Maximum Contaminant Levels (MCLs). California Dept of Health Services. Primary MCL	3
Pesticides – Organochlorines					
DDD(p,p')	0.00083 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR, Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
DDE(p,p')	0.00059 µg/L				
DDT(p,p')	0.00059 µg/L				
Dicofol	NA				
Dieldrin	0.00014 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.056 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) / Continuous Concentration 4-day average (total)	1

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Endrin	0.036 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-Day Average	1
	0.76 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
Methoxychlor	0.03 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA National Ambient Water Quality Criteria - Freshwater Aquatic Life Protection - instantaneous maximum	3
	30 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Pesticides – Organophosphates					
Azinphos methyl	0.01 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA National Ambient Water Quality Criteria - instantaneous maximum	3
Chlorpyrifos	0.015 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Rivers Basin Plan: page III-6.01; San Joaquin River & Delta, Sacramento & Feather Rivers; more stringent 4-day average.	1
Diazinon	0.1 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan: San Joaquin River & Delta numeric standard. Sacramento & Feather Rivers numeric standard	1
Dichlorvos	0.085 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water. Cal/EPA Cancer Potency Factor as a drinking water level	3
Dimethoate	1.0 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Notification Level – DHS (MUN, human health). California Notification Levels. (Department of Health Services)	3
Demeton-s	NA				
Disulfoton	0.05 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA National Ambient Water Quality Criteria - Freshwater Aquatic Life Protection - instantaneous maximum	3
Malathion	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Prohibition	2
Methamidophos	0.35 µg/L	Narrative	Municipal and Domestic Supply	Basin Plan Toxicity Objective, Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. USEPA IRIS Reference Dose (RfD) as a drinking water level.	3
Methidathion	0.7 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose (MUN, human health)	3
Parathion, Methyl	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Prohibition	2
Phorate	0.7 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. USEPA IRIS Reference Dose as a drinking water level.	3
Phosmet	140 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. USEPA IRIS Reference Dose as a drinking water level.	3

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Group A Pesticides					
Aldrin	0.00013 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	3 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Instantaneous maximum	
Chlordane	0.00057 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0043 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Heptachlor	0.00021 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0038 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Heptachlor Epoxide	0.0001 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0038 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Total Hexachlorocyclohexane (including lindane)	0.0039 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.95 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Maximum Concentration (1-hour Average)	
Endosulfan	110 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.056 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: NTR (USEPA) - Continuous Concentration 4-day average (total)	
Toxaphene	0.00073 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0002 µg/L		Cold Freshwater Habitat, Spawning	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Pesticides – Herbicides					
Atrazine	1.0 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Cyanazine	1.0 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA Health Advisory (human health)	3
Diuron	2 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water. USEPA Health Advisory. Likely to be carcinogenic to humans (U.S. Environmental Protection Agency, 2005 Guidelines for Carcinogen Risk Assessment).	3

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Glyphosate	700 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Linuron	1.4 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose as a drinking water level	3
Molinate	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Discharge Prohibition	2
Paraquat dichloride	3.2 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose as a drinking water level	3
Simazine	4.0 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Thiobencarb	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Discharge Prohibition	2
Trifluralin	5 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Cancer Risk Level. One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water	3
Metals (c)					
Arsenic	10 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: USEPA Primary MCL (MUN, human health)	1
Boron	700 µg/L	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcot)	3
Cadmium	for aquatic life; variable (see cadmium worksheet).	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - Varies with water hardness	1
	5 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Copper	for aquatic life; variable (see copper worksheet).	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - Varies with water hardness/	1
	1,300 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Lead	for aquatic life; variable (see lead worksheet).	Numeric	Freshwater Habitat	CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
	15 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Molybdenum	15 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan - San Joaquin River, Mouth of the Merced River to Vernalis	1
	50 µg/L			Sacramento/San Joaquin Basin Plan - Salt Slough, Mud Slough (north), San Joaquin River from Sack Dam to the mouth of Merced River	
	10 µg/L	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcot)	3
	35 µg/L		Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose as a drinking water level.	
Nickel	For aquatic life variable (see Nickel worksheet).	Numeric	Freshwater Habitat	CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
	100 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Selenium	50 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
	5 µg/L (4-day average)	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: NTR Freshwater Aquatic Life Protection - Continuous Concentration - 4-Day Average	
Zinc	For aquatic life variable (see Zinc worksheet).	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
Nutrients					
Nitrate as NO3 Nitrate as N	45,000 µg/L as NO3 10,000 µg/L as N	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Nitrite as Nitrogen	1,000 µg/L as N	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Ammonia	For aquatic life variable (see ammonia worksheet).	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA Freshwater Aquatic Life Criteria, Continuous Concentration	3
	1.5 mg/L (regardless of pH and Temperature values)	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Taste and Odor Threshold (Ammore and Hautala)	3
Hardness	NA				
Phosphorus, total	NA				
Orthophosphate, soluble	NA				
TKN	NA				

Category 1: Constituents that have numeric water quality objectives in the Sac-SJR Basin Plan or other WQO listed by reference such as MCLs (Page III-3.0)* , CTRs (Page III-10.1)*,
Category 2: Pesticides with discharge prohibitions. Prohibitions apply to any discharges not subject to board-approved management practices (Page IV-25.0)*.
Category 3: Constituent does not have numeric WQO, and does not have a primary MCL. WQTL exceedance is based on implementation of narrative objective. All detections should be tracked. None are default exceedances.
MUN-Municipal and Domestic Supply
NA-Not Available. Until completion of evaluation studies and MRP Plan submittals with site specific information on beneficial uses.
ND-Not Detected
(*)-Water Quality Control Plan for the Sacramento and San Joaquin River Basins. Revised on October 2007.
Narrative WQTLs are based on Water Quality Goals Database. Updated by Jon Marshack on July 16, 2008.

SUMMARY OF EXCEEDANCE REPORTS

All exceedance reports and communications are included in Appendix V. If any errors occurred in the original communication of the exceedance to the Regional Board from the Coalition, an updated report was transmitted to the Regional Board via email. A tally of all exceedances that occurred from January through December 2011 is listed by constituent in Tables 33-37. Additional sediment chemistry results associated with sediment toxicity can be found in Table 38. Where applicable, exceedances are tallied by the number of NM exceedances, the number of exceedances that occurred in non contiguous waterbodies (not connected to downstream waterbody), the number of MPM exceedances (red bolded values) and total count for all WQTL exceedances. If an exceedance occurred in both the environmental and field duplicate samples, the result was counted only once.

Table 33. Exceedances of field parameter WQTLs (including DO, pH and SC).

WQTLs are listed below each constituent. Field parameters under a management plan are all classified as Priority E constituents and are monitored only as a part of Normal Monitoring (see Management Plan approved November 25, 2008, Prioritization of Exceedances section) or when a site is monitored for a high priority constituent in a management plan.

Station Name	Sample Date	Season	DO	pH	SC
			<7 mg/L	<6.5 or >8.5	>700 µS/cm
Prairie Flower Drain @ Crows Landing Rd	1/18/2011	Winter1	5.35		2951
Deadman Creek @ Hwy 59	2/17/2011	Storm1		8.58	
Dry Creek @ Rd 18	2/17/2011	Storm1		8.71	
Duck Slough @ Gurr Rd	2/17/2011	Storm1		8.65	
Prairie Flower Drain @ Crows Landing Rd	2/17/2011	Storm1			2647
Duck Slough @ Gurr Rd	3/15/2011	Winter2	6.78		
Prairie Flower Drain @ Crows Landing Rd	3/15/2011	Winter2			2685
Berenda Slough along Ave 18 1/2	3/17/2011	Winter2-Sediment	6.72		
Dry Creek @ Wellsford Rd	3/17/2011	Winter2-Sediment		8.68	
Prairie Flower Drain @ Crows Landing Rd	3/17/2011	Winter2-Sediment			2643
Cottonwood Creek @ Rd 20	4/19/2011	Irrigation1	6.70		
Deadman Creek @ Hwy 59	4/19/2011	Irrigation1		9.09	
Lateral 2 1/2 near Keyes Rd	4/19/2011	Irrigation1		8.71	
McCoy Lateral @ Hwy 140	4/19/2011	Irrigation1		8.95	
Prairie Flower Drain @ Crows Landing Rd	4/19/2011	Irrigation1	2.14		1471
Prairie Flower Drain @ Crows Landing Rd	5/10/2011	Irrigation2			1775
Deadman Creek @ Hwy 59	5/17/2011	Irrigation2		9.63	
Dry Creek @ Wellsford Rd	6/14/2011	Irrigation3	6.36		
Prairie Flower Drain @ Crows Landing Rd	6/14/2011	Irrigation3			2035
Prairie Flower Drain @ Crows Landing Rd	6/15/2011	Irrigation3			2423
Dry Creek @ Wellsford Rd	7/12/2011	Irrigation4	6.82		
Prairie Flower Drain @ Crows Landing Rd	7/12/2011	Irrigation4			1083
Deadman Creek @ Hwy 59	7/19/2011	Irrigation4		8.57	
Dry Creek @ Rd 18	7/19/2011	Irrigation4		5.88	
Dry Creek @ Wellsford Rd	8/9/2011	Irrigation5	6.52		
Prairie Flower Drain @ Crows Landing Rd	8/9/2011	Irrigation5			1141
Berenda Slough along Ave 18 1/2	10/11/2011	Fall1	5.69		
McCoy Lateral @ Hwy 140	10/11/2011	Fall1		8.65	
Prairie Flower Drain @ Crows Landing Rd	10/11/2011	Fall1	6.59		2447
Highline Canal @ Hwy 99	11/8/2011	Fall2		8.77	
Prairie Flower Drain @ Crows Landing Rd	11/8/2011	Fall2			2206
Dry Creek @ Wellsford Rd	12/6/2011	Fall3	6.7		
Prairie Flower Drain @ Crows Landing Rd	12/6/2011	Fall3			2095
		Non Contiguous Waterbody Exceedances	**0**	**0**	**0**
		Total Exceedances	**11**	**12**	**13**

Table 34. Exceedances of *E. coli*, nutrients, metals and physical parameters WQTLs.

If a field duplicate and an environmental sample both exceeded the WQTL, only the environmental sample exceedance was included in this table. If an exceedance in the field duplicate sample and not the environmental sample occurred, the field duplicate result was included and noted by (FD) at the end of the station name. Constituents under a management plan that are not applied by agriculture are classified as Priority E constituents and are monitored only as a part of Normal Monitoring and not counted toward MPM Exceedances (see Management Plan approved November 25, 2008, Prioritization of Exceedances section). Red bolded values represent MPM exceedances.

Station Name	Sample Date	Season	*E. coli*	TDS	Ammonia	Nitrate + Nitrite	Copper Dissolved[1]	Molybdenum
			235 MPN/100 ml	450 mg/L	1.5 mg/L	10 mg/L	(hardness based trigger limit) µg/L	10, µg/L Total
Berenda Slough along Ave 18 1/2	1/18/2011	Winter1	520				6.8 (2.65)	
Deadman Creek @ Hwy 59	1/18/2011	Winter1	310					
Dry Creek @ Rd 18	1/18/2011	Winter1					**12 (8.65)**	
Dry Creek @ Wellsford Rd	1/18/2011	Winter1		660				
McCoy Lateral @ Hwy 140 (FD)	1/18/2011	Winter1					2.9 (1.97)	
Prairie Flower Drain @ Crows Landing Rd	1/18/2011	Winter1	870	1800	1.9	29		25
Berenda Slough along Ave 18 1/2	2/17/2011	Storm1	400				3.6 (1.87)	
Highline Canal @ Lombardy Rd	2/17/2011	Storm1	420				7.9 (6.12)	
Prairie Flower Drain @ Crows Landing Rd	2/17/2011	Storm1		1600		33		21
Deadman Creek @ Hwy 59	3/15/2011	Winter2	580					
Highline Canal @ Hwy 99	3/15/2011	Winter2	>2400					
Prairie Flower Drain @ Crows Landing Rd	3/15/2011	Winter2		1700		31		19
Rodden Creek @ Rodden Rd	3/15/2011	Winter2	240					
Berenda Slough along Ave 18 1/2	4/19/2011	Irrigation1					3.3 (1.36)	
Cottonwood Creek @ Rd 20	4/19/2011	Irrigation1					**4.6 (3.83)**	
Deadman Creek @ Hwy 59	4/19/2011	Irrigation1	2400					
Dry Creek @ Rd 18	4/19/2011	Irrigation1					**3.9 (3.2)**	
Dry Creek @ Wellsford Rd	4/19/2011	Irrigation1	2000					
Prairie Flower Drain @ Crows Landing Rd	4/19/2011	Irrigation1	>2400	800	12			
Dry Creek @ Wellsford Rd	5/10/2011	Irrigation2	340					
Prairie Flower Drain @ Crows Landing Rd	5/10/2011	Irrigation2	370	1000	1.8	17		11
Berenda Slough along Ave 18 1/2	5/17/2011	Irrigation2					3.8 (1.57)	
Cottonwood Creek @ Rd 20	5/17/2011	Irrigation2					**3.8 (3.02)**	
Dry Creek @ Rd 18	5/17/2011	Irrigation2					**2.9 (1.36)**	
Dry Creek @ Wellsford Rd	6/14/2011	Irrigation3	280					
Highline Canal @ Lombardy Rd	6/14/2011	Irrigation3	310					
Merced River @ Santa Fe Rd	6/14/2011	Irrigation3	770					

Station Name	Sample Date	Season	*E. coli*	TDS	Ammonia	Nitrate + Nitrite	Copper Dissolved[1]	Molybdenum
			235 MPN/100 ML	450 mg/L	1.5 mg/L	10 mg/L	(hardness based trigger limit) µg/L	10, µg/L Total
Prairie Flower Drain @ Crows Landing Rd	6/14/2011	Irrigation3		1200		24		13
Berenda Slough along Ave 18 1/2	6/21/2011	Irrigation3					3.6 (1.46)	
Cottonwood Creek @ Rd 20	6/21/2011	Irrigation3	550				**3.8 (3.74)**	
Deadman Creek @ Hwy 59	6/21/2011	Irrigation3	410					
Dry Creek @ Rd 18	6/21/2011	Irrigation3					**4.8 (1.03)**	
Duck Slough @ Gurr Rd	6/21/2011	Irrigation3	240					
Prairie Flower Drain @ Crows Landing Rd	7/12/2011	Irrigation4	>2400	770	1.8	16		
Berenda Slough along Ave 18 1/2	7/19/2011	Irrigation4					2.6 (1.03)	
Cottonwood Creek @ Rd 20	7/19/2011	Irrigation4					**4.3 (3.56)**	
Deadman Creek @ Hwy 59	7/19/2011	Irrigation4	460					
Dry Creek @ Rd 18	7/19/2011	Irrigation4					**4.3 (0.81)**	
Livingston Drain @ Robin Ave	7/19/2011	Irrigation4					**2.6 (1.67)**	
Prairie Flower Drain @ Crows Landing Rd	8/9/2011	Irrigation5	1000	680	4.1			
Berenda Slough along Ave 18 1/2	8/16/2011	Irrigation5	290				2.3 (1.25)	
Cottonwood Creek @ Rd 20	8/16/2011	Irrigation5	250					
Dry Creek @ Rd 18	8/16/2011	Irrigation5					**5.0 (0.81)**	
Duck Slough @ Gurr Rd	8/16/2011	Irrigation5	580					
Dry Creek @ Wellsford Rd	9/6/2011	Irrigation6	240					
Prairie Flower Drain @ Crows Landing Rd	9/6/2011	Irrigation6	370			11		
Berenda Slough along Ave 18 1/2	9/13/2011	Irrigation6	370				2.1 (1.46)	
Cottonwood Creek @ Rd 20	9/13/2011	Irrigation6					**5.8 (3.20)**	
Dry Creek @ Rd 18	9/13/2011	Irrigation6					**4.6 (1.03)**	
Livingston Drain @ Robin Ave	9/13/2011	Irrigation6					**1.7 (1.25)**	
McCoy Lateral @ Hwy 140 (FD)	9/13/2011	Irrigation6					1.2 (1.03)	
Berenda Slough along Ave 18 1/2	10/11/2011	Fall1	1600				4.2 (1.03)	
Cottonwood Creek @ Rd 20	10/11/2011	Fall1	>2400				4.1 (3.56)	
Howard Lateral @ Hwy 140	10/11/2011	Fall1					**1.1 (1.03)**	
McCoy Lateral @ Hwy 140	10/11/2011	Fall1					1.1 (1.03)	
Prairie Flower Drain @ Crows Landing Rd	10/11/2011	Fall1	290	1600		28		
Rodden Creek @ Rodden Rd	10/11/2011	Fall1	290					
Berenda Slough along Ave 18 1/2	11/8/2011	Fall2					3.1 (2.46)	
Prairie Flower Drain @ Crows Landing Rd	11/8/2011	Fall2	520	1500		33		

Station Name	Sample Date	Season	*E. coli*	TDS	Ammonia	Nitrate + Nitrite	Copper Dissolved[1]	Molybdenum
			235 MPN/100 ML	450 mg/L	1.5 mg/L	10 mg/L	(hardness based trigger limit) µg/L	10, µg/L Total
Rodden Creek @ Rodden Rd	11/8/2011	Fall2	1400					
Berenda Slough along Ave 18 1/2	12/6/2011	Fall3					3.7 (3.38)	
Dry Creek @ Wellsford Rd	12/6/2011	Fall3	330					
Prairie Flower Drain @ Crows Landing Rd	12/6/2011	Fall3	460	1400		41		
Rodden Creek @ Rodden Rd	12/6/2011	Fall3	250					
Normal Monitoring Exceedances			**37**	**12**	**5**	**10**	**16**	**5**
Non Contiguous Waterbody Exceedances			**0**	**0**	**0**	**0**	**0**	**0**
Management Plan Monitoring Exceedances[2]			**0**	**0**	**0**	**0**	**15**	**0**
Total Exceedances			**37**	**12**	**5**	**10**	**31**	**5**

[1] If copper exceedance is the dissolved fraction of copper, the limit based on hardness is shown in parenthesis.
[2] Management Plan Monitoring not conducted for nutrients, *E. coli*, TDS or molybdenum even if they are under a management plan.

Table 35. Exceedances of pesticide WQTLs.

If a field duplicate and an environmental sample both exceeded the WQTL, only the environmental sample exceedance was included in this table. If an exceedance in the field duplicate sample and not the environmental sample occurred, the field duplicate result was included and noted by (FD) at the end of the station name. Red bolded values represent MPM exceedances.

Station Name	Sample Date	Season	Sample Type[1]	Carbaryl 2.53 µG/L	Chlorpyrifos 0.015 µG/L	DDT 0.00059 µG/L	Dimethoate 1.0 µG/L	Diuron 2.0 µG/L
Rodden Creek @ Rodden Rd	2/17/2011	Storm1	NM					2.3
Berenda Slough along Ave 18 1/2	4/19/2011	Irrigation1	NM		0.021			
Deadman Creek @ Hwy 59	4/19/2011	Irrigation1	NM		0.016			
Highline Canal @ Hwy 99	6/14/2011	Irrigation3	NM			0.013		
Merced River @ Santa Fe Rd	6/14/2011	Irrigation3	NM			0.012		
Prairie Flower Drain @ Crows Landing Rd	6/14/2011	Irrigation3	NM			0.017		
Rodden creek @ Rodden Rd	6/14/2011	Irrigation3	NM			0.021		
Prairie Flower Drain @ Crows Landing Rd	8/9/2011	Irrigation5	NM	13			10	
Prairie Flower Drain @ Crows Landing Rd	9/6/2011	Irrigation6	NM				1.1	
Deadman Creek @ Hwy 59	9/13/2011	Irrigation6	NM		0.049			
Normal Monitoring Exceedances				**1**	**3**	**4**	**2**	**1**
Non Contiguous Waterbody Exceedances[2]				**0**	**0**	**0**	**0**	**0**
Management Plan Monitoring Exceedances[3]				**0**	**0**	**0**	**0**	**0**
Total Exceedances				**1**	**3**	**4**	**2**	**1**

NM-Normal Monitoring

[1]Sample type refers to the type of monitoring the constituent that exceeded the WQTL was undergoing during the month of monitoring.

[2]Non contiguous waterbody exceedances that occurred at an MPM site are counted in both MPM exceedance and non contiguous waterbody exceedance rows.

[3]Managment Plan Monitoring exceedance totals include sites either scheduled for MPM only or scheduled for NM and MPM.

Table 36. Water column and sediment toxicity exceedance summary.

If a field duplicate and an environmental sample both exceeded the WQTL, only the environmental sample exceedance was included in this table. If an exceedance in the field duplicate sample and not the environmental sample occurred, the field duplicate result was included and noted by (FD) at the end of the station name. Red bolded values represent MPM exceedances.

Station Name	Sample Date	Season & Toxicity Sample Type[1]	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
Prairie Flower Drain @ Crows Landing Rd	2/17/2011	Storm1, MPM, NM	*S. capricornutum*	Total Cell Count (cells/mL)	778069	**82**	SG	
Highline Canal @ Lombardy Rd	4/19/2011	Irrigation1, NM	*S. capricornutum*	Total Cell Count (cells/mL)	55126	8	SL	A TIE was conducted on 4/26/11 and it was concluded that no toxicity was present (sample lost all detectable toxicity prior to the TIE).
Prairie Flower Drain @ Crows Landing Rd	4/19/2011	Irrigation1, NM	*P. promelas*	Survival (%)	80	80	SG	
Prairie Flower Drain @ Crows Landing Rd	8/9/2011	Irrigation5, NM	*C. dubia*	Survival (%)	0	0	SL	A TIE was conducted on 8/11/11 and it was concluded that pyrethroid insecticides were the cause of toxicity.
Dry Creek @ Wellsford Rd	9/6/2011	Irrigation6, MPM, NM	*H. azteca*	Survival (%)	65	**76**	SL	Pyrethroids and chlorpyrifos detected.
Duck Slough @ Gurr Rd	9/13/2011	Irrigation6, MPM, NM	*H. azteca*	Survival (%)	83	**90**	SG	
Duck Slough @ Gurr Rd	10/11/2011	Fall1, NM	*P. promelas*	Survival (%)	90	90	SG	
Prairie Flower Drain @ Crows Landing Rd	10/11/2011	Fall1, NM	*S. capricornutum*	Total Cell Count (cells/mL)	204925	35	SL	A TIE was conducted on 10/19/11 and it was concluded that no toxicity was present (sample lost all detectable toxicity prior to the TIE).
Prairie Flower Drain @ Crows Landing Rd	12/6/2011	Fall3, NM	*S. capricornutum*	Total Cell Count (cells/mL)	84434	8	SL	A TIE was conducted on 12/14/11 and it was concluded that no toxicity was present (sample lost all detectable toxicity prior to the TIE).

MPM – Management Plan Monitoring
NM-Normal Monitoring
SG-Statistically significantly different from control; greater than 80% threshold
SL-Statistically significantly different from control; less than 80% threshold
[1]Season & Sample Type column includes the type of monitoring the toxic species was undergoing during the month of monitoring.

Table 37. Water column toxicity tally.

MONITORING TYPE	*C. DUBIA*	*P. PROMELAS*	*S. CAPRICORNUTUM*	*H. AZTECA*
Normal Monitoring Exceedances	1	2	3	0
Non Contiguous Waterbody Exceedances[1]	0	0	0	0
Management Plan Monitoring Exceedances[2]	0	0	1	2
Total	1	2	4	2

[1]Non contiguous waterbody exceedances are counted in both NM or MPM exceedance rows and non contiguous waterbody exceedance rows.
[2]Managment Plan Monitoring exceedance totals include sites either scheduled for MPM only or scheduled for NM and MPM.

Table 38. Sediment toxicity chemistry results for samples with 80% or less survival when compared to the control.

Station Name	Sample Date	Monitoring Type	*H. azteca* (% Control)	Sediment Pesticides µg/kg dw										TOC (mg/Kg dw)	Mean GS Description	Median GS (mm)
				Bifenthrin, µg/kg	Chlorpyrifos , µg/kg	Cyfluthrin, µg/kg	Cyhalothrin, lambda µg/kg	Cypermethrin, µg/kg	Deltamethrin:Tralomethrin, µg/kg	Esfenvalerate/Fenvalerate, µg/kg	Fenpropathrin, µg/kg	Permethrin, µg/kg	Tetramethrin µg/kg			
Dry Creek @ Wellsford Rd	09/06/2011	MPM	76	J0.32	J0.15	ND	ND	ND	ND	ND	ND	ND	ND	1800	Sand (Medium)[1]	0.609

GS- Grain Size
IN-Integrated sample
J-Estimated value
MPM-Management Plan Monitoring
ND- Not Detected
TOC- Total Organic Carbon
[1]Sand (Medium): 0.425 to 2.0 mm

DISCUSSION OF EXCEEDANCES

Pesticide Use Report Data

The PUR data are provided to the Coalition from each of the county Agricultural Commissioner's offices and are evaluated for applications relevant to exceedances of WQTLs. All PUR data are considered preliminary and may contain some level of inaccuracy until they are finalized and made available through CalPIP. To assess possible sources of toxicity, applications of pesticides known to be toxic to the test species are identified based on a variety of factors including the organic carbon partition coefficient (K_{oc}), chemical type, mode of action, and solubility. If sediment toxicity occurs, then pesticides with a K_{oc} of 1600 or greater are considered relevant. If water toxicity occurs, then pesticides with a relatively low K_{oc} (below 1900) are evaluated. Most pesticides were queried for applications within 30 days prior to water sampling. Applications of pyrethroid pesticides, due to their long half-life, are queried for a period of 180 days prior to the date of the exceedance, and metals are queried for a period of 90 days prior to the exceedance (Table 39). If there were no applications within the specified time period, the PUR database was queried an additional 30 days prior to the standard query period. Appendix IV includes tables and maps of all pesticide applications that are relevant to WQTL exceedances or toxicity. If the PUR data for any county are unattainable at the time of this report, a note is made in Appendix IV. Information regarding available and outstanding PUR is included in Table 31. Any outstanding PUR will be submitted in an addendum to the AMR on June 1, 2012.

Exceedances of aldrin, dieldrin, endrin, HCH, DDD, DDE, DDT or molybdenum cannot be queried since there are no longer any registered products that contain these chemicals. Of the pesticide exceedances in 2011, DDT and molybdenum had no PUR data associated because they are not registered products and could not be queried.

Table 39. Pesticide Use Data collected for reported exceedances.

EXCEEDANCE TYPE	PESTICIDE USE DATA COLLECTED
Pesticides	30 days
Metals	90 days
Sediment Toxicity	90 days with 180 days for pyrethroids
Water Column Toxicity	30 days with 180 days for pyrethroids and 90 days for metals

Exceedances that occurred from January through December 2011 are tabulated by zone in Tables 40-45. The following section discusses possible sources of WQTL exceedances; an assessment of agricultural pesticide applications that are potential sources of the exceedances accompanies the tables. All PUR data relevant to pesticide exceedances and toxicity are discussed based on the pounds (lbs) of active ingredient (AI) applied upstream of the sampling site. Measures taken to address these exceedances are described in the Actions Taken to Address Water Quality Exceedances section.

Zone 1 (Dry Creek @ Wellsford Rd and Rodden Creek @ Rodden Rd)

Field Parameters, Total Dissolved Solids and E. coli

In Zone 1, there were four exceedances of the WQTL for DO, one for pH, one for TDS and nine for *E. coli* (Table 40). All of the DO exceedances occurred at Dry Creek @ Wellsford and were above 6 mg/L (WQTL is >7.0 mg/L). The single pH and TDS exceedances were also at Dry Creek @ Wellsford. The pH was slightly greater than the WQTL of >8.5 (result was 8.68). Generally TDS and SC exceedances are correlated however in the case of the single Dry Creek @ Wellsford exceedance of TDS (660 mg/L compared to the WQTL of 450 mg/L), there was no SC exceedance. The *E. coli* exceedances occurred in both subwatersheds and ranged from 240 – 2000 MPN/100 mL at Dry Creek @ Wellsford (the highest amount occurred in April) and 240 – 1400 MPN/100 mL at Rodden Creek @ Rodden Rd (the highest amount occurred in November). Both subwatersheds have dairies in the area and exceedances may be associated with spring/fall applications of manure.

DDT

Exceedances of DDT and its breakdown products, DDE and DDD, are the result of past applications. Products such as DDT, aldrin, and dieldrin are no longer registered or legally applied within the United States but persist because of their exceptionally high K_{oc} and long half life. It is estimated that the half life of DDT in aquatic systems is probably over 150 years (http://www.speclab.com/compound/c50293.htm). DDT was banned in 1972, and the United States Environmental Protection Agency (USEPA) prohibited application of aldrin and dieldrin in 1974 (except for uses on termites); in 1987 all uses were banned. These pesticides may be bound to sediment in the channels and become mobilized periodically by several mechanisms.

A sample collected on June 14, 2011 from Rodden Creek @ Rodden Rd exceeded the DDT WQTL a concentration of 0.021µg/L (Table 40). This exceedance is a result of legacy pesticide use and cannot be attributed to current agricultural practices.

Diuron

Diuron is a broad-spectrum herbicide used for weed control on agriculture, highway rights of way, and by homeowners. It inhibits photosynthesis and also affects seed germination. Diuron has a half-life (in soil) of about 90 days and is very mobile. Diuron inhibits growth of *S. capricornutum* with an Effective Concentration of 50% of the measured endpoint (EC_{50}) of 2.4 µg/L compared to the WQTL of 2 µg/L (Table 40).

Samples from the first storm event on February 17, 2011 from Rodden Creek @ Rodden Rd exceeded the WQTL containing 2.3 µg/L of diuron. The PUR data indicate that no reported applications were associated with this exceedance (Appendix IV). The last reported use of diuron was in May, 2010. No toxicity was associated with this exceedance. Diuron will continue to be monitored at Rodden Creek at Rodden Rd as part of scheduled Assessment Monitoring in 2012.

Toxicity

Sediment samples collected for MPM on September 6, 2011 from Dry Creek @ Wellsford Rd tested toxic to *H. azteca* (76% survival compared to the control, Table 40). Since survival was 80% or less than the control, additional chemistry analysis for pyrethroids and chlorpyrifos was required. Pesticides detected were:

bifenthrin (J0.32 µg/kg dw) and chlorpyrifos (J0.15 µg/kg dw), as listed in Table 38. Both detections were less than the reporting limit and therefore are considered estimates. Total organic carbon concentration was 1800 mg/kg for this sample with a median grain size of 0.609 mm (medium sand). The PUR data indicate that a total of 518 applications of all pyrethroids and chlorpyrifos ranging between 0.0001 and 9.78 lbs AI per acre were associated with this toxicity. The majority of applications were to almonds and walnuts (with other applications to beans, corn, grapes, peaches, nectarines, pistachios, plums, rice, and outdoor plants) across 38,484 acres between April 9, 2011 and September 3, 2011 (Appendix IV). Seventy-one applications were of bifenthrin on almonds (42), corn (15) and walnuts (14). Twenty-six of the applications of chlorpyrifos were made on almonds (11), corn (2) and walnuts (13). Management Plan Monitoring for toxicity to *H. azteca* will continue at Dry Creek @ Wellsford Rd in 2012.

Table 40. Zone 1 (Dry Creek @ Wellsford Rd and Rodden Creek @ Rodden Rd) exceedances

ZONE 1 STATION NAME	SAMPLE TYPE CODE	SAMPLE DATE	DO, MG/L	PH, NONE	TOTAL DISSOLVED SOLIDS, MG/L	*E. COLI*, MPN/100 ML	DDT, µG/L	DIURON, µG/L	*H. AZTECA*, % CONTROL
Dry Creek @ Wellsford Rd	NM	1/18/2011			660				
Dry Creek @ Wellsford Rd	MPM, NM, SED	3/17/2011		8.68					
Dry Creek @ Wellsford Rd	MPM, NM	4/19/2011				2000			
Dry Creek @ Wellsford Rd	NM	5/10/2011				340			
Dry Creek @ Wellsford Rd	NM	6/14/2011	6.36			280			
Dry Creek @ Wellsford Rd	MPM, NM	7/12/2011	6.82						
Dry Creek @ Wellsford Rd	MPM, NM	8/9/2011	6.52						
Dry Creek @ Wellsford Rd	MPM, NM, SED	9/6/2011				240			76
Dry Creek @ Wellsford Rd	NM	12/6/2011	6.70			330			
Rodden Creek @ Rodden Rd	NM	2/17/2011						2.3	
Rodden Creek @ Rodden Rd	NM	3/15/2011				240			
Rodden Creek @ Rodden Rd	NM	6/14/2011					0.021		
Rodden Creek @ Rodden Rd	NM	10/11/2011				290			
Rodden Creek @ Rodden Rd	NM	11/8/2011				1400			
Rodden Creek @ Rodden Rd	NM	12/6/2011				250			

DO-Dissolved Oxygen
MPM-Management Plan Monitoring
NM-Normal Monitoring
SED- Sediment Monitoring

Zone 2 (Lateral 2 ½ near Keyes Rd and Prairie Flower Drain @ Crows Landing Rd)

Field Parameters, Total Dissolved Solids, and E. coli

In Zone 2, there were three exceedances of the WQTL for DO, 13 for SC, 11 for TDS, one for pH and nine for *E. coli* from January through December 2011 (Table 41). All exceedances of the SC, TDS and *E. coli* WQTLs were from samples collected from Prairie Flower Drain @ Crows Landing Rd. Prairie Flower Drain is in an area with shallow, salty groundwater with tile drains constructed to drain salty subsurface water. Samples from Prairie Flower Drain resulted in SC exceedances during every month of 2011 and measurements above the 700 µS/cm WQTL ranged from 770 to 2951 µS/cm. All of the 11 TDS exceedances were associated with an SC exceedance. Much of the Prairie Flower subwatershed has dairies and/or lands managed by dairies that receive manure. The previous exceedances of salt (EC/TDS), *E. coli,* and nutrients (ammonia and nitrate) at Prairie Flower Drain may be associated dairy manure applications and/or possible discharges from dairy lagoons. Five of the nine *E. coli* exceedances were also associated with ammonia exceedances.

The single pH exceedance was detected during MPM at Lateral 2 ½ near Keyes Rd and was slightly above the WQTL of >8.5 with a measured value of 8.71 (Table 41).

Ammonia

Ammonium can enter a waterbody through three sources: 1) direct discharge of agricultural fertilizers (anhydrous ammonia), 2) direct discharge of animal waste, and 3) discharge from wastewater treatment plants. In soils, ammonia from fertilizers is typically converted to nitrite and then to nitrate over a short period of time. Therefore, ammonium from fertilizers would require a direct discharge to surface waters to detect ammonia in the receiving waterbody. The method of anhydrous ammonium application to fields is injection into soil arguing against direct discharge. Ammonium can also be formed in the waterbody through the mineralization of organic nitrogen. Previous exceedances of the ammonia WQTL and associated water column toxicities were attributed to discharge from dairies. In Zone 2, five exceedances of the ammonia WQTL occurred in samples collected from January through December 2011; all were from samples collected from Prairie Flower Drain @ Crows Landing Rd (Table 41).

Samples collected from the first irrigation event on April 19, 2011 from Prairie Flower Drain contained 12 mg/L ammonia and were also toxic to *P. promelas* (80% survival). Regional Board staff informed the Coalition that there was a dairy wastewater discharge on April 19, 2011, which was observed roughly one mile upstream from the sample location. It is likely that the dairy wastewater discharge is responsible for both the high ammonia and *P. promelas* toxicity that occurred in samples collected on April 19, 2011. In addition, this discharge may have contributed to other exceedances within the subwatershed including low DO, nitrate, *E. coli* and salts (SC/TDS).

Nitrates

Potential sources of nitrate in surface waters include runoff of fertilizer or organic matter from irrigated fields, leaking septic systems, waste-treatment facility effluent, and inputs from animal waste. These sources can move to surface waters through above ground runoff or shallow subsurface flows. Total Kjeldahl nitrogen and ammonium in animal waste that enter surface waters can be converted to nitrate by nitrifying bacteria. Possible sources of animal waste in a waterbody include dairies, poultry operations, pasture and/or wildlife. From years of movement of nitrate from dairies into groundwater, there is a significant amount of nitrate in the aquifers beneath the ESJWQC region. Many of these aquifers are very shallow and many of the drains in the western portion of the Coalition were constructed in the 1800s to lower the water table and allow farming. More recently, tile drains have been placed in the area of the Coalition, and these further remove shallow ground water from the subsurface and move it to surface drainages. As a result, nitrate in shallow groundwater originating from dairies may now be intercepted by the field and surface drains resulting in exceedances of the nitrate WQTL. Deeper wells contaminated with nitrate can be a source of irrigation water. Excessive nutrients can cause eutrophication of surface waters resulting in low DO and an inability to support healthy aquatic communities. Sources of nutrients, organic carbon, and low DO are difficult to identify. Because of the extreme solubility of nitrate, the only way for nitrates in fertilizer to enter surface water is for them to move to surface waters immediately after application and it is unlikely that applications in the spring would result in exceedances of the WQTL throughout the irrigation season. In Zone 2, there were 10 exceedances of the nitrate WQTL from January through December 2011; all exceedances of nitrate were from samples collected from Prairie Flower Drain @ Crows Landing Rd. Four of the exceedances were also associated with ammonia exceedances and seven were associated with *E. coli* exceedances (Table 41).

Molybdenum

Although it is possible for molybdenum to be applied by agricultural, there are no registered products containing this constituent currently in use in the Coalition area. Molybdenum can be a byproduct in copper and tungsten mining and is used in alloys due to its ability to withstand high temperatures, resistance to corrosion, and its weldability. The west side of the ESJWQC region is naturally elevated in molybdenum and it can be flushed into surface waters during periods of high rainfall. Drains such as Prairie Flower Drain (which were constructed to drain shallow groundwater and allow agriculture) can develop elevated concentrations of molybdenum when the groundwater is driven into the channel. In living organisms, molybdenum acts as a metal heteroatom and is present in various enzymes including aldehyde oxidase, sulfite oxidase and xanthine oxidase. Molybdenum can also be found in green beans, eggs, sunflower seeds, wheat flour, lentils and cereal grains. In animal studies chronic ingestion of 10 mg/kg of molybdenum can cause diarrhea, growth retardation, sterility, low birth weight, and gout (http://en.wikipedia.org/wiki/Molybdenum). In Zone 2, there were five exceedances of the molybdenum WQTL from January through December 2011; all were from samples collected from Prairie Flower Drain @ Crows Landing Rd (Table 41).

Samples collected on January 18, February 17, March 15, May 10 and June 14, 2011 from at Prairie Flower Drain @ Crows Landing Rd resulted in exceedances of the molybdenum WQTL of 10 mg/L. All

samples collected from Prairie Flower Drain had detections ranging from 8.2 to 25 mg/L (Appendix II). It is most likely that molybdenum is naturally occurring within this subwatershed. There are no registered products currently in use in the ESJWQC region associated with molybdenum. The first year that molybdenum was monitored at Prairie Flower Drain was 2011 as part of scheduled Assessment Monitoring. This is the first year of Assessment Monitoring and therefore the first year that elevated levels of molybdenum have been detected at Prairie Flower Drain. Molybdenum will continue to be monitored at Prairie Flower Drain during high TSS events during the next Assessment Monitoring rotation scheduled for 2014.

Carbaryl

Carbaryl is a wide-spectrum carbamate chemical used as a molluscicide, insecticide, and acaricide on a variety of crops such as corn, alfalfa, strawberries, nuts, and vines. Carbaryl is applied to animals as an ectoparasiticide to control fleas, lice, ticks and mites in household pets, livestock and poultry. Carbaryl is a neurotoxin that works by being ingested into the digestive tract of the pest or is absorbed through direct contact. It is available as bait, dusts, wettable powders, granules, dispersions and suspensions. Carbaryl is known to be toxic to aquatic and estuarine invertebrates, including insects and crustaceans, and is moderately to highly toxic to fish species such as *P. promelas* (http://extoxnet.orst.edu/pips/carbaryl.htm).

On August 9, 2011, an exceedance of the carbaryl WQTL (2.3 µg/L) occurred at Prairie Flower Drain @ Crows Landing Rd with a concentration of 13 µg/L (Table 41). The grower who applied carbaryl was identified and is a member of the Coalition. The grower applied carbaryl instead of chlorpyrifos and followed label directions. The Coalition is working with the grower to obtain Prop 84 funds to implement a sediment retention pond which will reduce and/or eliminate any future discharge from the property into Prairie Flower Drain. Prairie Flower Drain @ Crows Landing Rd is a Core site and 2011 was the first year for Assessment Monitoring under the current MRPP; therefore, 2011 was the first year that carbaryl was monitored since the constituent was sampled from 2006 through 2008 under the old 2006 MRPP. Samples resulted in detections of carbaryl in 2006 once, 2007 once and in 2008 three times; no exceedances of the carbaryl WQTL occurred during previous years of monitoring. The PUR data associated with the August 2011 carbaryl exceedance indicate a single application of carbaryl (Red-Top) on June 8, 2011 to 50 acres of corn at 0.25 lbs AI per acre. Monitoring for carbaryl will continue at Prairie Flower Drain in 2014 when the site rotates back into Assessment Monitoring.

DDT

In Zone 2, a single exceedance of DDT (0.017 µg/L) occurred in samples collected on June 14, 2011 at Prairie Flower Drain @ Crows Landing Rd (Table 41). This exceedance is a result of legacy pesticide use and cannot be attributed to current agricultural practices.

Dimethoate

Dimethoate is an organophosphate insecticide that is used in California predominantly on alfalfa, tomatoes, oranges and corn. Dimethoate is an acetylcholinesterase inhibitor. Like chlorpyrifos and malathion, dimethoate is known to be toxic to birds, fish such as *P. promelas* and aquatic invertebrates

such as *C. dubia* (http://extoxnet.orst.edu/pips/dimethoa.htm). In Zone 2, two exceedances of the dimethoate 1.0 µg/L WQTL occurred.

Exceedances of the dimethoate WQTL occurred in samples collected on August 9, 2011(10 µg/L) and September 6, 2011 (1.1 µg/L); both exceedances were from samples collected at Prairie Flower Drain @ Crows Landing Rd (Table 41). As mentioned above, 2011 was the first year for Assessment Monitoring at Prairie Flower Drain under the current MRPP; therefore, 2011 was the first year that dimethoate was monitored since the constituent was sampled in 2006 through 2008 under the 2006 MRPP. Samples resulted in detections of dimethoate in 2006 once, none in 2007 and two times in 2008 at Prairie Flower Drain. The dimethoate detected in August 2011 was also associated with toxicity to *C. dubia* (0% survival, Table 41). The PUR data associated with the August and September exceedances were identical since the most recent application associated with the September exceedance was on August 4, 2011. The PUR data indicate that there were nine applications of dimethoate (Drexel) at 0.50 lbs AI per acre to 419 acres of corn and beans (with the majority being applied to corn) between July 13, 2011 and August 4, 2011 (Appendix IV). Monitoring for dimethoate will continue at Prairie Flower Drain when the site rotates back into Assessment Monitoring in 2014 and the constituent has been added to the site's management plan.

Toxicity

In Zone 2, water column toxicity occurred once to *C. dubia,* once to *P. promelas* and three times to *S. capricornutum* from January through December 2011 (Table 41). All toxic samples were collected from Prairie Flower Drain @ Crows Landing Rd. Prairie Flower Drain @ Crows Landing Rd was an Assessment Monitoring location in 2011 and therefore toxicity monitoring was conducted for all species monthly. Additionally, *S. capricornutum* toxicity (January, February, April and May) and *C. dubia* toxicity (March and September) MPM was scheduled. Management Plan Monitoring for toxicity to *S. capricornutum*, *C. dubia* and *P. promelas* is scheduled to take place again in 2012.

Samples collected on February 17, October 11 and December 6, 2011 from Prairie Flower Drain @ Crows Landing Rd were toxic to *S. capricornutum* (82% growth, 35% growth and 8% growth compared to the control, respectively). Algae growth in the February sample was greater than 50% compared to the control and therefore a TIE was not initiated. Although the amount of growth in the sample compared to the control was statistically significant, the growth was greater than 80% when compared to the control; therefore, the reduction in growth in the sample (18% compared to the control) is not considered ecologically relevant. A TIE was initiated on both the October and December samples; however, the toxicity was not persistent throughout the TIE and therefore the TIE was inconclusive (Appendix VI). The PUR data associated with the February toxicity indicate there were 53 herbicide applications ranging between 0.02 and 3.79 lbs AI per acre. Applications of herbicides included the following 11 AIs: carfentrazone-ethyl, diglycolamine salt of 3,6-dichloro-o-anisic acid, MCPA, dimethylamine salt, imazethapyr, ammonium salt, 4-(2,4-DB), bromoxynil heptanoate, clethodim, pendimethalin and bromoxynil octanoate (Shark EW, Clarity, Nufarm Rhomene MCPA Broadleaf, Persuit, Butyrac , Buctril, Arrow and Prowl H2O Herbicide). Applications occurred across 1644 acres of alfalfa, oats, and wheat between January 20, 2011 and February 17, 2011 (Appendix IV). Samples were

collected during this monitoring event to test for herbicides, and although no exceedances occurred, there were slight levels of dissolved copper and diuron detected in the samples (6µg/L and 0.2µg/L, respectively).

The PUR data associated with the October and December *S. capricornutum* toxicities were not available for review at the time of this report; all outstanding PUR will be submitted on June 1, 2012 in an addendum to the AMR. There were no detections of associated of herbicides during these two events.

Samples collected during the first irrigation event on April 19, 2011 from Prairie Flower Drain @ Crows Landing Rd were toxic to *P. promelas* (80% survival compared to the control). Survival was greater than 50% compared to the control and therefore a TIE was not initiated. Samples from this April event also exceeded the WQTL for ammonia with a concentration of 12 mg/L. It is likely that the high ammonia was the cause of the 20% reduction in *P. promelas* survival. The PUR data associated with this toxicity indicate there were a total of 9 applications across 542 acres of alfalfa and sweet potatoes between March 9, 2011 and April 16, 2011. There were applications of lambda-cyhalothrin, malathion and dichloropropene (Silencer, Lambda-cy, Malathion B Aquamul, Warrior and Telone) between 0.03 and 108.84 lbs AI per acre with the majority of AI being applied to sweet potatoes (Appendix IV). Samples collected during the fifth irrigation event on August 9, 2011 from Prairie Flower Drain @ Crows Landing Rd were toxic to *C. dubia* (0% survival compared to the control). The TIE indicated that pyrethroid insecticides were the cause of the toxicity. Pyrethroids readily bind to sediment and the Coalition only analyzes for pyrethroids in sediments when toxicity to *H. azteca* occurs in a sediment sample. The PUR data associated with this *C. dubia* toxicity indicate there were a total of 65 applications ranging between 0.01 and 29.40 lbs AI per acre of pyrethroids and other chemicals. Of the pyrethroids associated with this toxicity, there were 23 applications across 1148 acres between May 5 and August 4, 2011 of cypermethrin, bifenthrin, Deltamethrin, and permethrin ranging between 0.0134 and 0.8499 lbs AI per acre. Additionally, there were applications of acephate, chlorpyrifos, hexythiazox, methoxyfenozide, propargite, spiromesifen and sulfur (Acephate, Battalion, Bifenture, Capture, Comite, Drexel, Fanfare, Hero, Intrepid, Lorsban, Nufos, Oberon, Onager, Pounce, Stiletto, Wilbur-Ellis Dusting Sulfur) to 3,168 acres of corn, beans and tomatoes (with the majority being applied to corn) between May 5, 2011 and August 9, 2011 (Appendix IV).

Table 41. Zone 2 (Lateral 2 ½ near Keyes Rd and Prairie Flower Drain @ Crows Landing Rd) exceedances

Zone 2 Station Name	Sample Type Code	Sample Date	DO, mg/L	pH, none	SC, µS/cm	Total Dissolved Solids, mg/L	Ammonia as N, mg/L	*E. coli*, MPN/100 mL	Nitrate + Nitrite as N, mg/L	Molybdenum, Total µg/L	Carbaryl, µg/L	DDT, µg/L	Dimethoate, µg/L	*C. dubia*, % Control	*P. promelas*, % Control	*S. capricornutum*, % Control
Lateral 2 ½ near Keyes Rd	MPM	4/19/2011		8.71												
Prairie Flower Drain @ Crows Landing Rd	MPM, NM	1/18/2011	5.35		2951	1800	1.9	870	29	25						
Prairie Flower Drain @ Crows Landing Rd	MPM. NM	2/17/2011			2647	1600			33	21						82
Prairie Flower Drain @ Crows Landing Rd	MPM, NM	3/15/2011			2685	1700			31	19						
Prairie Flower Drain @ Crows Landing Rd	MPM, NM, SED	3/17/2011			2643											
Prairie Flower Drain @ Crows Landing Rd	MPM, NM	4/19/2011	2.14		1471	800	12	>2400							80	
Prairie Flower Drain @ Crows Landing Rd	MPM, NM	5/10/2011			1775	1000	1.8	370	17	11						
Prairie Flower Drain @ Crows Landing Rd	NM	6/14/2011			2035	1200			24	13		0.017				
Prairie Flower Drain @ Crows Landing Rd	NM	6/15/2011			2423											
Prairie Flower Drain @ Crows Landing Rd	NM	7/12/2011			1083	770	1.8	>2400	16							
Prairie Flower Drain @ Crows Landing Rd	MPM, NM	8/9/2011			1141	680	4.1	1000			13		10	0		
Prairie Flower Drain @ Crows Landing Rd	MPM, NM, SED	9/6/2011						370	11				1.1			
Prairie Flower Drain @ Crows Landing Rd	NM	10/11/2011	6.59		2447	1600		290	28							35
Prairie Flower Drain @ Crows Landing Rd	NM	11/8/2011			2206	1500		520	33							
Prairie Flower Drain @ Crows Landing Rd	NM	12/6/2011			2095	1400		460	41							8

DO-Dissolved Oxygen
MPM-Management Plan Monitoring
NM-Normal Monitoring
SC-Specific Conductance
SED- Sediment monitoring

Zone 3 (Highline Canal @ Hwy 99 and Highline Canal @ Lombardy Ave)

E. coli

In Zone 3, there were three exceedances of the *E. coli* WQTL from January through December 2011 (Table 42). Two of the exceedances occurred at Highline Canal @ Lombardy and the other exceedance occurred downstream at Highline Canal @ Hwy 99 (Table 42). Exceedances of the *E. coli* WQTL at these two sites on Highline Canal did not occur during the same sampling events. During 2011 monitoring, Highline Canal @ Hwy 99 was dry January, February and December; Highline Canal @ Lombardy Rd was dry in December.

Copper

There are a number of possible sources of copper in waterbodies within the Coalition region. Copper is applied as a fungicide to a variety of vegetable crops, grains, and fruit and nut orchards in numerous forms such as copper hydroxide, copper sulfide and copper oxide. Copper can also enter drainage systems from sources other than agriculture. Copper is commonly used by dairies and can also enter waterbodies through the weathering of rocks and soils. Automobile components may also contain copper and wearing of brakes can add substantial amounts of copper to surface waters that pass through urban areas. Dissolved copper results are adjusted for the hardness of the water to determine if the bioavailable amount of copper could be toxic to aquatic life. Therefore, the WQTL for dissolved copper will be different for each sample. In Zone 3, there was one dissolved copper exceedance from January through December 2011 (Table 42).

Samples collected during the first storm event on February 17, 2011 from Highline Canal @ Lombardy Rd contained 7.9 µg/L dissolved copper; downstream samples were not collected on the same day at Highline Canal @ Hwy 99 due to the site being dry . The PUR data indicate there were 85 applications of copper (Champ, Nordox, Cuprofix, Kocide, Kenton DF, and NU-COP) ranging from 0.13 to 14.7 lbs AI per acre across 10,165 acres of almonds, apricots, and peaches between November 28, 2010 and February 17, 2011 (Appendix IV). Highline Canal is a TID supply canal and therefore does not generally accept drainage from nearby parcels. However, some growers may return irrigation tailwater or storm water to the canal. Pesticide applications were made by ground and air indicating a potential for spray drift from parcels adjacent to the canal being treated. There was a significant amount of precipitation in the region 24 hours prior to monitoring and therefore storm runoff could have transported pesticides into the canal. No water column toxicity occurred during February monitoring. Copper will continue to be monitored at Highline Canal @ Lombardy Rd as part of 2012 Assessment Monitoring.

DDT

In Zone 3, a single exceedance of DDT (0.013 ug/L) occurred in samples collected on June 14, 2011 from Highline Canal @ Hwy 99 (Table 42). This exceedance is a result of legacy pesticide use and cannot be attributed to current agricultural practices.

Samples collected on April 19, 2011 from Highline Canal @ Lombardy Ave were toxic to *S. capricornutum* (8% growth compared to the control); downstream samples collected on the same day at Highline Canal @ Hwy 99 had 393% algae growth compared to the growth in control samples. Algae growth was less than 50% compared to the control and therefore a TIE was initiated; however, the TIE baseline test did not detect toxicity, indicating the sample lost all detectable toxicity prior to initiation of the TIE (Appendix VI). The PUR data associated with this toxicity indicate there were 349 herbicide applications ranging between 0.003 and 201 lbs AI per acre. Applications of herbicides included the following 25 AIs: 2,4-D, dimethylamine salt, carfentrazone-ethyl, chloropicrin, chlorothalonil, copper (hydroxide, oxide, sulfate), flumioxazin, glufosinate-ammonium, glyphosate, isopropylamine salt, halosulfuron-methyl, isoxaben, mancozeb, methyl bromide, mineral oil, norflurazon, oryzalin, oxyfluorfen, paraquat, pendimethalin, penoxsulam, petroleum oil, rimsulfuron, simazine and s-metolachlor (NU-COP, Cuprofix, Champ, Nordox, Kocide, Equus, Bravo, Gly Star, Goal, Surflan, Firestorm, Amine, Oryzalin, Alecto, Shark, First Choice Gavicide, Riverdale Dri-Clean, Galigan, Nufarm, Terr-O-Gas, Honcho, Chlorothalonil, Manzate Pro-Stick, Bucaneer, Saber, Oxystar, Paraquat, Alecto, Chateau, Gramoxone, Gallery, Goaltender, Pindar, Britz, Prowl, Dual Magnum, Princep, Touchdown, Orchard Star, Round Up, Dri-Clean, Solicam, Rely, and Sandea). Applications were across 29,788 acres of alfalfa, almonds, peaches, tomatoes, and walnuts between January 26, 2011 and April 19, 2011 (Appendix IV). Samples were collected during this event to analyze for herbicides, and no exceedances were reported. Water column toxicity to *S. capricornutum* will continue to be monitored at Highline Canal @ Lombardy Rd as part of Assessment Monitoring in 2012.

Table 42. Zone 3 (Highline Canal @ Hwy 99 and Highline Canal @ Lombardy Ave) exceedances

Zone 3 Station Name	Sample Type Code	Sample Date	pH, none	*E. coli*, MPN/100 mL,	Copper Dissolved, µg/L (hardness based trigger limit)	DDT, µg/L	*S. capricornutum*, % Control
Highline Canal @ Hwy 99	MPM, NM	3/15/2011		>2400			
Highline Canal @ Hwy 99	MPM, NM	6/14/2011				0.013	
Highline Canal @ Hwy 99	NM	11/8/2011	8.77				
Highline Canal @ Lombardy Rd	NM	2/17/2011		420	7.9 (6.12)		
Highline Canal @ Lombardy Rd	NM	4/19/2011					8
Highline Canal @ Lombardy Rd	NM	6/14/2011		310			

MPM-Management Plan Monitoring
NM-Normal Monitoring

Zone 4 (Bear Creek @ Kibby Rd, Howard Lateral @ Hwy 140, Livingston Drain @ Robin Ave, McCoy Lateral @ Hwy 140 and Merced River @ Santa Fe)

Field Parameters and E. coli

In Zone 4, there were two exceedances of the WQTL for pH at McCoy Lateral @ Hwy 140 (8.95 and 8.65) and one for *E. coli* at Merced River @ Santa Fe (770 MPN/100 mL) from January through December 2011 (Table 43). In 2011, Livingston Drain @ Robin Ave was dry during January and February, and McCoy Lateral @ Hwy 140 was dry during February, March and December.

Copper

In Zone 4, there were six exceedances of the dissolved copper WQTL with concentrations ranging from 1.1 to 3.0 µg/L (Table 43). Toxicity was not associated with any of the dissolved copper exceedances.

Samples collected for MPM from Howard Lateral @ Hwy 140 resulted in an exceedance of the dissolved copper WQTL on October 11, 2011 in (1.1 µg/L, the WQTL based on hardness is 1.03 µg/L). During 2011 MPM, dissolved copper concentrations ranged from 1.1 to 2.1 µg/L; this was the only exceedances of the hardness based WQTL. The PUR data associated with this copper exceedance were not available for review at the time of this report. Management Plan Monitoring for copper will continue during months of past exceedances at Howard Lateral @ Hwy 140 in 2012.

Management Plan Monitoring samples collected on July 19, 2011 and September 13, 2011 from Livingston Drain @ Robin Ave resulted in exceedances levels of dissolved copper (2.6 µg/L and 1.7 µg/L, respectively). Samples were also collected for MPM in May and June of 2011 and there were no exceedances (2 µg/L and 2.4 µg/L, respectively). The PUR data associated with the July exceedance indicate there were 36 applications of copper (Wil-Dry) ranging from 1.32 to 16.01 lbs AI per acre across 1,219 acres of grapes between July 2, 2011 and July 19, 2011 (Appendix IV). The PUR data associated with the September exceedance indicate there were 48 applications of copper (Wil-Dry) ranging from 1.32 to 16.01 lbs AI per acre across 1,676 acres of grapes between July 2, 2011 and July 22, 2011 (Appendix IV). Management Plan Monitoring for copper will continue during months of past exceedances at Livingston Drain @ Robin Ave in 2012.

Samples collected for copper on January 18, 2011 from McCoy Lateral @ Hwy 140 resulted in concentrations of dissolved copper above the WQTL in both the environmental and field duplicate samples (2.9 µg/L and 3.0 µg/L, respectively). The ESJQWC region recorded heavy rainfalls of more than 0.5 inches in Modesto from January 1-2, 2011, as well as a few days of scattered showers in the weeks following; subsequent storm runoff may have contributed to the dissolved copper found in samples. In 2011, these were the highest concentrations of dissolved copper detected in samples collected from McCoy Lateral @ Hwy 140 (2011 was the first year that this site was monitored). The PUR data associated with the January exceedance indicate there were 27 applications of copper (Champ, Cuprofix, Kocide, and Nordox) to almonds, nectarines, peaches, and plums ranging between 3.93 and 9.24 lbs AI per acre. Copper applications occurred on 680 acres between December 3, 2010 and January 17, 2011 (Appendix IV). Samples collected on September 13, 2011 (FD) and October 11, 2011 from McCoy Lateral

@ Hwy 140 resulted in exceedance levels of dissolved copper (1.2 µg/L (FD) and 1.1 µg/L, respectively). The associated environmental sample collected on September 13 also contained 1.2 µg/L; however the hardness associated with the environmental sample was slightly higher than the field duplicate and therefore was not an exceedance of the hardness based WQTL for dissolved copper. The PUR data associated with the September field duplicate exceedance indicate that 42 applications of copper (Wil-Dry) were applied at 1.32 to 16.01 lbs AI per acre across 1,496 acres of grapes between July 2, 2011 and July 22, 2011 (Appendix IV). The PUR data associated with the October exceedance were not available for review at the time of this report; all outstanding PUR will be submitted on June 1, 2012 in an addendum to the AMR. Copper is scheduled to be monitored again at McCoy Lateral @ Hwy 140 as part of Assessment Monitoring in 2012.

DDT

In Zone 4, a single exceedance of the DDT WQTL occurred in samples collected on June 14, 2011 from Merced River @ Santa Fe Drive (0.012 µg/L , Table 43). This exceedance is a result of legacy pesticide use and cannot be attributed to current agricultural practices.

Table 43. Zone 4 (Bear Creek @ Kibby Rd, Howard Lateral @ Hwy 140, Livingston Drain @ Robin Ave, McCoy Lateral @ Hwy 140 and Merced River @ Santa Fe) exceedances

Zone 4 Station Name	Sample Type Code	Sample Date	pH, none	*E. coli*, MPN/100 mL,	Copper Dissolved, µg/L (Hardness based trigger limit)	DDT, µg/L
Howard Lateral @ Hwy 140	MPM	10/11/2011			1.1 (1.03)	
Livingston Drain @ Robin Ave	MPM	7/19/2011			2.6 (1.67)	
Livingston Drain @ Robin Ave	MPM, SED	9/13/2011			1.7 (1.25)	
McCoy Lateral @ Hwy 140	NM	1/18/2011			2.9 (1.97)	
McCoy Lateral @ Hwy 140 (FD)	NM	1/18/2011			3.0 (2.17)	
McCoy Lateral @ Hwy 140	NM	4/19/2011	8.95			
McCoy Lateral @ Hwy 140 (FD)	NM, SED	9/13/2011			1.2 (1.03)	
McCoy Lateral @ Hwy 140	NM	10/11/2011	8.65		1.1 (1.03)	
Merced River @ Santa Fe	NM	6/14/2011		770		0.012

FD- Field Duplicate
MPM-Management Plan Monitoring
NM-Normal Monitoring

Zone 5 (Deadman Creek @ Hwy 59, Duck Slough @ Gurr Rd and Duck Slough @ Hwy 99)

Field Parameters and E. coli

In Zone 5, there was one exceedance of the WQTL for DO, five for pH, and seven for *E. coli* (Table 44). The single DO exceedance was slightly less than the WQTL of 7 mg/L at Duck Slough @ Gurr Rd (6.78 mg/L). Four of the five pH exceedances occurred at Deadman Creek @ Hwy 59, ranged between 8.57 and 9.09 and were above the 8.5 maximum WQTL for pH. The fifth pH exceedance occurred at Duck Slough @ Gurr Rd with a level of 8.65. The seven *E. coli* exceedances occurred in samples collected from both Deadman Creek and Duck Slough with concentrations ranging from 240 to 2400 MPN/100 mL.

Chlorpyrifos

Chlorpyrifos is an organophosphate pesticide applied for pest control on alfalfa, grapes, and deciduous orchards, among other crops in California. In a waterbody, chlorpyrifos can both bind to sediment and remain in the water column (K_{oc} of 6070). The lethal concentration at 50% mortality (LC_{50}) for chlorpyrifos to *C. dubia* is 0.055µg/L. In Zone 5, two exceedances of the chlorpyrifos WQTL occurred from January through December 2011; both exceedances occurred at Deadman Creek @ Hwy 59 (Table 44).

Samples collected during the first irrigation event from Deadman Creek @ Hwy 59 on April 19, 2011 exceeded the chlorpyrifos WQTL containing 0.016 µg/L. From March 18-26, 2011, the ESJWQC region received very heavy rainfall which may have resulted in storm runoff within this subwatershed. This was followed by a smaller rain event on April 7, 2011 (less than 0.25 inches in 24 hours). The rain that occurred in late March and early April may have mobilized some of the applied chlorpyrifos into Deadman Creek. There was no associated toxicity of *C. dubia.* The PUR data associated with the April chlorpyrifos exceedance indicate there were 26 applications of chlorpyrifos (Lorsban and Whirlwind) ranging between 0.20 to 0.23 lbs AI per acre across 2262 acres comprised primarily of alfalfa between March 25, 2011 and April 8, 2011 (Appendix IV). Samples collected during the last irrigation monitoring event on September 13, 2011 from Deadman Creek @ Hwy 59 exceeded the chlorpyrifos WQTL containing 0.049 µg/L. The PUR data associated with this chlorpyrifos exceedance indicate that 2 applications of chlorpyrifos (Whirlwind and Quali-Pro) between 0.50 and 2.00 lbs AI per acre occurred over 146 acres of walnut and alfalfa between August 30, 2011 and September 9, 2011 (Appendix IV). No toxicity was associated with the April or September chlorpyrifos exceedances. Management Plan Monitoring for chlorpyrifos will continue during months of past exceedances at Deadman Creek @ Hwy 59 in 2012. Due to past exceedances of chlorpyrifos in 2010, the Coalition sent informational letters to members in the Deadman Creek subwatershed, including management practice information, on May 27, 2011 (Table 46).

Toxicity

In Zone 5, water column toxicity occurred once to *P. promelas* and sediment toxicity occurred once to *H. azteca* in samples collected from January through December 2011 (Table 44). Both toxic samples were collected from Duck Slough @ Gurr Rd and both samples had 90% survival compared to the control.

Duck Slough @ Gurr Rd was an Assessment Monitoring location during 2011 and therefore toxicity analysis was conducted for all species during each monthly monitoring event. Duck Slough @ Gurr Rd was dry during the December monitoring event. Additionally, MPM was scheduled at Duck Slough @ Gurr Rd for *H. azteca* sediment toxicity (September), as specified in the Coalition's MPM schedule.

Sediment samples collected on September 13, 2011 from Duck Slough @ Gurr Rd resulted in *H. azteca* survival being statistically different from the survival in the sample. However, the percent survival was 90% compared to the control and therefore the difference between the sample and control survival is not considered ecologically relevant (Table 44). Additional sediment chemistry analysis was not required (survival was greater than 80% compared to the control). The PUR data indicate that a total of 586 applications of pyrethroids and chlorpyrifos ranging between 0.0001 and 2.50 lbs AI per acres were associated with this toxicity. The majority of applications were to almonds, corn and cotton (with other applications on alfalfa, cantaloupe, oat, peach, peppers, pistachio, radicchio, sudan grass and tomato) across 32,147 acres between March 31, 2011 and September 10, 2011 (Appendix IV). Management Plan Monitoring for *H. azteca* toxicity will continue at Duck Slough @ Gurr Rd during 2012.

Samples collected on October 10, 2011 from Duck Slough @ Gurr Rd resulted in *P. promelas* survival being statistically different from the survival in the sample. However, the percent survival was 90% compared to the control and therefore the difference between the sample and control survival is not considered ecologically relevant (Table 44). A TIE was not initiated as survival was greater than 50% compared to the control. No other exceedances occurred at Duck Creek @ Gurr Rd during this sampling event. The PUR data associated with this *P. promelas* toxicity were not available for review at the time of this report. Monitoring for *P. promelas* toxicity will occur again when Duck Slough @ Gurr Rd rotates back into Assessment Monitoring in 2014.

Table 44. Zone 5 (Deadman Creek @ Hwy 59, Duck Slough @ Gurr Rd and Duck Slough @ Hwy 99) exceedances

ZONE 5 STATION NAME	SAMPLE TYPE CODE	SAMPLE DATE	DO, MG/L	PH, NONE	*E. COLI*, MPN/100 ML	CHLORPYRIFOS, µG/L	*P. PROMELAS*, % CONTROL	*H. AZTECA*, % CONTROL
Deadman Creek @ Hwy 59	NM	1/18/2011			310			
Deadman Creek @ Hwy 59	NM	2/17/2011		8.58				
Deadman Creek @ Hwy 59	NM	3/15/2011			580			
Deadman Creek @ Hwy 59	NM	4/19/2011		9.09	2400	0.016		
Deadman Creek @ Hwy 59	NM	5/17/2011		9.63				
Deadman Creek @ Hwy 59	NM	6/21/2011			410			
Deadman Creek @ Hwy 59	NM	7/19/2011		8.57	460			
Deadman Creek @ Hwy 59	NM, SED	9/13/2011				0.049		
Duck Slough @ Gurr Rd	MPM, NM	2/17/2011		8.65				
Duck Slough @ Gurr Rd	MPM, NM	3/15/2011	6.78					
Duck Slough @ Gurr Rd	MPM, NM	6/21/2011			240			
Duck Slough @ Gurr Rd	NM	8/16/2011			580			
Duck Slough @ Gurr Rd	MPM, NM, SED	9/13/2011						90
Duck Slough @ Gurr Rd	NM	10/11/2011					90	

DO-Dissolved Oxygen
MPM- Management Plan Monitoring
NM-Normal Monitoring
SED- Sediment monitoring

Zone 6 (Berenda Slough along Ave 18 ½, Cottonwood Creek @ Rd 20, Dry Creek @ Rd 18)

Field Parameters and E. coli

In Zone 6, there were three exceedances of the WQTL for DO, one for pH and eight for *E. coli* from January through December 2011 (Table 45). Two of the DO WQTL exceedances occurred at Berenda Slough along Ave 18 ½ in March (6.72 mg/L) and October (5.69 mg/L). The third DO WQTL exceedance in Zone 6 occurred at Cottonwood Creek @ Rd 20 with 6.70 mg/L on April 19, 2011. The single pH exceedance occurred at Dry Creek @ Rd 18 in February and was slightly higher than the WQTL of 8.5.

Five of the 11 *E. coli* WQTL exceedances occurred in samples collected from Berenda Slough along Ave 18 ½ in January, February, August, September and October (Table 45). Concentrations above the WQTL of 235 MPN/100 mL ranged between 370 and 1600 MPN/100 mL. Samples collected from Cottonwood Creek @ Hwy 120 exceeded the WQTL for *E. coli* three times (both the environmental and the field duplicate sample) ranging from 250 to >2400 MPN/100 mL.

Copper

In Zone 6, there were 24 exceedances of the hardness based dissolved copper WQTL from January through December 2011 (Table 45). Exceedances in both the environmental and field duplicate samples occurred six times in Zone 6. Toxicity was not associated with any of the copper exceedances in this Zone. Exceedance levels of dissolved copper were common in samples collected from all sites monitored in Zone 6 (Berenda Slough along Ave 18 ½, Cottonwood Creek @ Rd 20 and Dry Creek @ Rd 18) during 2011; therefore, it is possible that certain geologic conditions and/or soils with high copper content contribute to the elevated copper levels found in water column samples from Zone 6. Concentrations of dissolved copper that exceeded the hardness based WQTL range from 2.1 mg/L to 12 mg/L (Table 45).

Samples collected during the during the first winter event on January 18, 2011 and during the first storm event on February 17, 2011 from Berenda Slough along Ave 18 ½ resulted in elevated levels of dissolved copper (6.8 µg/L and 3.6 µg/L, respectively). The PUR data associated with the January exceedance indicate there were 27 applications of copper (Badge, Cuprofix and Kocide) across 1,311 acres of almonds ranging between 0.92 and 3.23 lbs AI per acre between December 30, 2010 and January 18, 2011 (Appendix IV). Heavy rainfall of more than 0.5 inches was recorded in Modesto from January 1-2, 2011, as well as a few days of scattered showers in the weeks following, which could have moved copper downstream. The PUR data associated with the February exceedance indicate there were 57 applications of copper (Badge, Champ, Cuprofix, NU-COP and Kocide) across 2,922 acres of almonds ranging between 0.92 and 4.73 lbs AI per acre between December 30, 2010 and January 31, 2011 (Appendix IV). Copper exceedances at Berenda Slough continued through the irrigation season during the months of April (3.3 µg/L), May (3.8 µg/L), June (3.6 µg/L), July (2.6 µg/L), August (2.3 µg/L), and September (2.1 µg/L). The PUR data associated with the April 19, 2011 exceedance indicated that there were 47 applications of copper (Champ, Cuprofix, NU-COP, Kentan and Kocide) across 3,513 acres of almonds, grapes and walnuts ranging between 0.46 and 4.62 lbs AI per acre between January 25, 2011

and April 10, 2011 (Appendix IV). Very heavy rainfall March 18-26, 2011 resulted in large amounts of storm runoff entering the waterways and moving downstream, which could have contributed to the April exceedance. The PUR data associated with the May 17, 2011 exceedance indicated that there were 14 applications of copper (Cuprofix, NU-COP, Kentan and Kocide) across 1,669 acres of almonds, grapes, and walnuts ranging between 0.46 and 2.13 lbs AI per acre between March 3, 2011 and April 10, 2011 (Appendix IV). The PUR data associated with the June 21, 2011 exceedance indicated that there were 11 applications of copper (Cuprofix, Kentan and Kocide) across 1,602 acres of grapes and walnuts ranging between 0.46 and 5.69 lbs AI per acre between March 31, 2011 and June 7, 2011 (Appendix IV). The PUR data associated with the July 19, 2011, August 16, 2011, and September 13, 2011 dissolved copper exceedances were not available for review at the time of this report.

Dissolved copper exceedances continued through the fall monitoring events at Berenda Slough @ Ave 18 ½, with exceedances occurring on October 11, 2011 (4.2 µg/L), November 8, 2011 (3.1 µg/L in the environmental sample and 3.2 µg/L in the field duplicate) and December 6, 2011 (3.7 µg/L in the environmental sample and 3.6 µg/L in the field duplicate). The PUR data associated with these October and November dissolved copper exceedances were not available for review at the time of this report. Because 2011 is the first year that dissolved copper was monitored at Berenda Sough, no exceedances of the WQTL for dissolved copper occurred prior to 2011 monitoring. Copper is now a management plan constituent for this subwatershed and will be discussed further in the MPUR, to be submitted April 1, 2012. Copper will continue to be monitored at Berenda Slough along Ave 18 ½ as part of Assessment Monitoring in 2012.

Management Plan Monitoring samples collected in April, May, June, July and September as well as NM samples collected in October from Cottonwood Creek @ Rd 20 resulted in exceedances of the dissolved copper WQTL (Table 45). Both the environmental and field duplicate samples exceeded the WQTL in April (4.6 and 5.2 mg/L), May (3.8 and 3.8 mg/L), July (4.3 and 4.2 mg/L) and October (4.1 and 3.8 mg/L) at Cottonwood Creek. Samples collected in June only exceeded the WQTL in the field duplicate sample, with the environmental sample having a slightly lower copper concentration (3.7 µg/L environmental sample and 3.8 µg/L field duplicate). A majority of Cottonwood Creek is elevated above the surrounding farmland and therefore the most likely source of agricultural inputs to the creek would be from spray drift. In addition, Madera Irrigation District has a number of spill sites that feed into Cottonwood Creek and it is unclear if water from the spill locations could be contributing to any of the copper detected in samples from Cottonwood Creek.

The Cottonwood Creek PUR data associated with the April 19, 2011 exceedance (4.6 µg/L in the environmental sample and 5.2 µg/L in the field duplicate) indicate there were 150 applications of copper (Badge, Cuprofix, Champ, Nordox, Kentan, NU-COP and Kocide) to 6,890 acres of almonds, cherries, grapes, peaches, orange, plums, prunes, tangelos, tangerines and stone fruit (with the majority being applied to grapes) ranging from 0.23 and 5.40 lbs AI per acre between January 25, 2011 and April 11, 2011 (Appendix IV). The PUR data associated with the May 17, 2011 exceedance (3.8 µg/L in both the environmental and field duplicate samples) indicate there were 119 applications of copper (Badge, Cuprofix, Champ, Nordox, Kentan, NU-COP and Kocide) to 5,337 acres of cherries, grapes, prunes and

stone fruit (with the majority being applied to grapes) ranging between 0.23 and 5.21 lbs AI per acre between February 24, 2011 and May 6, 2011 (Appendix IV). The PUR data associated with the June 21, 2011 exceedance (3.8 µg/L in the field duplicate sample) indicate there were 94 applications of copper (Badge, Cuprofix, Champ, Nordox, Kentan, NU-COP, Oxycop and Kocide) to 4,556 acres of grapes ranging between 0.20 and 10.00 lbs AI per acre between March 31, 2011 and June 16, 2011 (Appendix IV). The PUR data associated with the July 19, 2011 exceedance (4.3 µg/L in the environmental sample and 4.2 µg/L in the field duplicate), the September 13, 2011 exceedance (5.8 µg/L in the environmental sample) and the October 11, 2011 exceedance (4.1 µg/L in the environmental sample and 3.8 µg/L in the field duplicate) were not available for review at the time of this report. Cottonwood Creek @ Rd 20 was dry during November and December 2011 monitoring events. Management Plan Monitoring for copper will continue at Cottonwood Creek @ Rd 20 in 2012.

Management Plan Monitoring samples collected during the first winter event (January) and through the irrigation season (April-September) from Dry Creek @ Rd 18 resulted in exceedances of the dissolved copper WQTL. Samples for MPM were collected in January and May to analyze for *S. capricornutum* toxicity, and toxicity did not occur during either event. The PUR data associated with the January 18, 2011 exceedance (12 µg/L) at Dry Creek @ Rd 18 indicate there were 38 applications of copper (Cuprofix, Champ, Phyton and Kocide) to 1,866 acres of almonds, oranges, and tangerines ranging between 0.48 and 5.07 lbs AI per acre between October 28, 2010 and January 18, 2011 (Appendix IV). Additionally, heavy rainfalls of more than 0.5 inches in Modesto from January 1-2, 2011, and scattered showers in the weeks following created storm runoff that could have moved the copper into the water column. The PUR data associated with the April 19, 2011 exceedance (3.9 µg/L) indicate there were 33 applications of copper (Badge, Cuprofix, NU-COP, Phyton and Kocide) to 1,218 acres of almonds, apricots, grapes, and greenhouse flowers ranging between 0.29 and 9.79 lbs AI per acre between January 25, 2011 and April 10, 2011 (Appendix IV). Very heavy rainfall on March 18-26, 2011 resulted runoff which could have contributed to this exceedance in April. The PUR data associated with the May 17, 2011 exceedance (2.9 µg/L) indicate there were 20 applications of copper (Badge, Kocide and Phyton) to 537 acres of grapes and greenhouse flowers (with the majority being applied to grapes) ranging between 0.29 and 9.79 lbs AI per acre between February 24, 2011 and May 5, 2011 (Appendix IV). The PUR data associated with the June 21, 2011 exceedance (8.8 µg/L) indicate there were 18 applications of copper (Badge, Kocide and Phyton) to 533 acres of grapes and greenhouse flowers (with the majority being applied to grapes) ranging between 0.29 and 9.79 lbs AI per acre between March 30, 2011 and June 3, 2011 (Appendix IV). The PUR data associated with the July 19, 2011 exceedance (4.3 µg/L), the August 16, 2011 exceedance (5.0 µg/L) and the September 13, 2011 exceedance (4.6 µg/L) were not available for review at the time of this report. Management Plan Monitoring for copper will continue at Dry Creek @ Rd 18 in 2012.

Chlorpyrifos

Samples collected during the first irrigation event on April 19, 2011 from Berenda Slough along Ave 18 ½ resulted in an exceedance of the chlorpyrifos WQTL with 0.021 µg/L (Table 45). Very heavy rainfall from March 18-26, 2011 resulted in large amounts of storm runoff; suspended materials entering the waterbody and moving downstream could have contributed to this exceedance. Toxicity was not

associated with this exceedance. The PUR data indicate there were four applications of chlorpyrifos (Warhawk and Govern) ranging between 0.19 to 0.25 lbs AI per acre across 176 acres of alfalfa between March 27, 2011 and April 2, 2011 (Appendix IV). Chlorpyrifos will continue to be monitored at Berenda Slough along Ave 18 ½ during Assessment Monitoring in 2012.

Table 45. Zone 6 (Berenda Slough along Ave 18 1/2, Cottonwood Creek @ Rd 20 and Dry Creek @ Rd 18) exceedances

Zone 6 Station Name	Sample Type Code	Sample Date	DO, mg/L	pH, none	*E. coli* MPN/100 mL	Copper Dissolved, µg/L (Hardness based trigger limit)	Chlorpyrifos, µg/L
Berenda Slough along Ave 18 ½	NM	1/18/2011			520	6.8 (2.65)	
Berenda Slough along Ave 18 ½	NM	2/17/2011			400	3.6 (1.87)	
Berenda Slough along Ave 18 ½	NM, SED	3/17/2011	6.72				
Berenda Slough along Ave 18 ½	NM	4/19/2011				3.3 (1.36)	0.021
Berenda Slough along Ave 18 ½	NM	5/17/2011				3.8 (1.57)	
Berenda Slough along Ave 18 ½	NM	6/21/2011				3.6 (1.46)	
Berenda Slough along Ave 18 ½	MPM, NM	7/19/2011				2.6 (1.03)	
Berenda Slough along Ave 18 ½	NM	8/16/2011			290	2.3 (1.25)	
Berenda Slough along Ave 18 ½	MPM, NM, SED	9/13/2011			370	2.1 (1.46)	
Berenda Slough along Ave 18 ½	NM	10/11/2011	5.69		1600	4.2 (1.03)	
Berenda Slough along Ave 18 ½	NM	11/8/2011				3.1 (2.46)	
Berenda Slough along Ave 18 ½-FD	NM	11/8/2011				3.2 (2.26)	
Berenda Slough along Ave 18 ½	NM	12/6/2011				3.7 (3.38)	
Berenda Slough along Ave 18 ½-FD	NM	12/6/2011				3.6 (3.56)	
Cottonwood Creek @ Rd 20	MPM, NM	4/19/2011	6.70			4.6 (3.83)	
Cottonwood Creek @ Rd 20-FD	MPM, NM	4/19/2011				5.2 (3.65)	
Cottonwood Creek @ Rd 20	MPM, NM	5/17/2011				3.8 (3.02)	
Cottonwood Creek @ Rd 20-FD	MPM, NM	5/17/2011				3.8 (2.46)	
Cottonwood Creek @ Rd 20	MPM, NM	6/21/2011			550		
Cottonwood Creek @ Rd 20-FD	MPM, NM	6/21/2011			460	3.8 (3.74)	
Cottonwood Creek @ Rd 20	MPM, NM	7/19/2011				4.3 (3.56)	
Cottonwood Creek @ Rd 20-FD	MPM, NM	7/19/2011				4.2 (3.56)	
Cottonwood Creek @ Rd 20	MPM, NM	8/16/2011			250		
Cottonwood Creek @ Rd 20-FD	MPM, NM	8/16/2011			250		
Cottonwood Creek @ Rd 20	MPM, NM, SED	9/13/2011				5.8 (3.20)	
Cottonwood Creek @ Rd 20	NM	10/11/2011			>2400	4.1 (3.56)	
Cottonwood Creek @ Rd 20-FD	NM	10/11/2011			>2400	3.8 (3.74)	
Dry Creek @ Rd 18	MPM	1/18/2011				12 (8.65)	
Dry Creek @ Rd 18	MPM	2/17/2011		8.71			
Dry Creek @ Rd 18	MPM	4/19/2011				3.9 (3.2)	
Dry Creek @ Rd 18	MPM	5/17/2011				2.9 (1.36)	
Dry Creek @ Rd 18	MPM	6/21/2011				4.8 (1.03)	
Dry Creek @ Rd 18	MPM	7/19/2011				4.3 (0.81)	
Dry Creek @ Rd 18	MPM	8/16/2011				5.0 (0.81)	
Dry Creek @ Rd 18	MPM, SED	9/13/2011				4.6 (1.03)	

DO-Dissolved Oxygen
FD- Field Duplicate
MPM- Management Plan Monitoring
NM-Normal Monitoring
SED- Sediment monitoring

ACTIONS TAKEN TO ADDRESS WATER QUALITY EXCEEDANCES

The Coalition conducts monitoring of ambient surface waters to characterize discharges from irrigated agriculture. Results from each event within a monitoring season can be used to identify constituents, agricultural lands, crops and/or specific pesticides that need to be managed to reduce or eliminate input from agriculture. A series of actions taken to determine the potential sources of exceedances may include the following: 1) the use of PURs to identify relevant applications that occurred upstream of the sample site and within a specified time period prior to the sampling event, 2) an analysis of monitoring data and toxicity results to better understand the potential sources and toxicity of detected constituents, and 3) special studies where appropriate and cost effective.

The Coalition notified the Regional Board of all exceedances with electronically submitted Exceedance Reports (Appendix V). Any discrepancies or omissions have been described in the Discussion of Results section. Monitoring results are disseminated to Coalition members via grower mailings, at grower outreach meetings and, in some cases, by personal communication. The Coalition creates an Annual Report for Coalition members to notify them of exceedances that have occurred throughout the year. Grower notification, management practice outreach and education, as well as management practice implementation and tracking are all additional actions taken by the Coalition to ensure that growers are aware of downstream water and sediment quality concerns. Appendix VII includes available meeting agendas and handouts.

MANAGEMENT PRACTICES

In previous years the Coalition provided members with handbooks that contain information on management practices to reduce storm water runoff, discharge of irrigation water, and mobilization of sediments into receiving waters. In 2011, additional management practices such as use of alternative products, structural changes to manage drain water, and utilizing pesticide application practices that minimize spray drift have been presented at individual and group meetings and in various mailings. Appendix VII includes available meeting agendas and handouts that occurred from January through December 2011.

The Coalition obtains updates to management practice information by conducting individual interviews of growers within subwatersheds operating under a management plan. The Coalition's Management Plan includes a schedule of prioritized subwatersheds and details regarding this strategy (last updated in the 2011 MPUR, pages 24-29 and Table 6). The purpose of the individual interviews is to review current farm management practices, determine if additional management practices are applicable, and document implementation of any new practices.

From 2008 through 2010, the Coalition conducted focused outreach in designated first priority subwatersheds: Dry Creek @ Wellsford Rd, Prairie Flower Drain @ Crows Landing Rd and Duck Slough @ Hwy 99. Individual grower meetings documenting growers' current management practices and any

recommended practices and follow up meetings to assess the implementation of new management practice are completed for 100% of targeted growers. Final results of these contacts in the Prairie Flower Drain subwatershed were reported in the 2011 MPUR Summary of Implemented Management Practices section. The final results for the Dry Creek and Duck Slough subwatersheds will be reported in the 2012 MPUR. The mailings and meetings related to these contacts are detailed in the 2011 AMR Actions Taken to Address Water Quality Exceedances section.

During 2011, the Coalition made progress with its management plan tracking process in the second set of high priority subwatersheds (2010-2012): Bear Creek @ Kibby Rd, Cottonwood Creek @ Hwy 20, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99. As described in the 2011 AMR, individual contacts documenting targeted growers' current and recommended management practices were conducted in the spring and summer of 2010. Letters announcing follow up meetings were sent to all targeted growers in the Highline Canal subwatershed on February 1 in the Cottonwood Creek subwatershed on February 15 and in the Bear Creek and Duck Slough subwatersheds on February 16, 2011 (Table 46). The meetings were initially scheduled for late February and early March, but the majority of growers were unable to attend. The Coalition sent out rescheduled follow up meeting announcements to all targeted growers on April 14, 2011 (Table 46). Fourteen targeted growers attended the Cottonwood Creek Follow Up Meeting on April 26 and three, four, and three members were represented in attendance for Bear Creek, Duck Slough and Highline Canal, respectively, at the follow-up meeting on April 28, 2011. Growers used Response Card® interactive keypads to indicate any changes in their operations, including implementation of new management practices since individual interview meetings in 2009 and 2010. The remaining growers unable to attend the meetings were sent either an email with a web address to an Online Follow Up Survey form on May 11 (seven, three, one, and four growers in Bear Creek, Cottonwood Creek, Duck Slough, and Highline Canal, respectively) or a letter with a printed Follow Up Survey form on May 20, 2011 (four, five, one, and one growers in Bear Creek, Cottonwood Creek, Duck Slough, and Highline Canal, respectively). The Coalition on June 1, 2011 sent a final contact letter to members who had yet to complete a follow up survey (Table 46). Follow up surveys are now complete for 100% of contacts, and the results will be reported in the 2012 MPUR.

The Coalition continued with its management plan tracking process during 2011 in the third set of high priority subwatersheds (2011-2013): Berenda Slough, Dry Creek @ Rd 18, Lateral 2 ½ near Keyes Rd, and Livingston Drain @ Robin Ave. Via mailings sent in the fall of 2010, targeted growers in the Dry Creek, Lateral 2 ½, and Livingston Drain subwatersheds were notified of the management plan tracking process and the requirement to schedule a meeting with Coalition representatives to review their operations (Table 46). The 22 targeted members in the Berenda Slough subwatershed received a similar mailing on March 9, 2011 (Table 46). The seven members in the Livingston Drain subwatershed who were unresponsive to the Coalition's attempts to schedule individual meetings were sent a final contact letter on November 7, 2011 (Table 46). The Coalition mailed all growers who participated in individual interview meetings a summary of their survey responses on November 15, 2011 to confirm the responses were accurate and for grower's records (Table 46). Individual interviews with 100% of targeted growers were completed in the fall of 2011 and the results will be reported in the 2012 MPUR.

The management plan tracking process has begun for the fourth set of high priority subwatersheds: Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, and Hilmar Drain @ Central Ave. The Coalition compiled a list of one, two, eight, and four targeted growers in the Black Rascal Creek, Deadman Creek @ Gurr, Deadman Creek @ Hwy 59, and Hilmar Drain subwatersheds, respectively. The Coalition plans to mail targeted growers a letter requesting they contact the Coalition to schedule a required meeting with a Coalition representative. The Coalition will begin individual grower meetings in 2012.

OUTREACH AND EDUCATION

Outreach and education activities are an important component of the Coalition monitoring program. The Coalition continues to provide information to growers through mailings, at regular meetings, at meetings conducted by the County Agricultural Commissioner, and by personal contact. Coalition presentations at various grower meetings during 2011 informed members of the Coalition's progress in achieving water quality goals, site subwatershed specific monitoring results, and management practices proven to be effective to reduce the discharge of pesticides to waterbodies. All outreach and education activities are documented in Table 46.

Overall, Coalition representatives conducted or participated in six meetings from January through December 2011. All meetings addressed sediment runoff concerns and reviewed management practices, five meetings addressed storm and irrigation water quality concerns, four meetings discussed groundwater, and two meetings addressed specific site subwatershed management plans. Overall, the Coalition sent out 25 mailings and/or emails from January through December 2011. Of those mailings, all addressed irrigation water quality and sediment runoff, 17 reviewed management practices, 11 addressed specific site subwatershed management plans, and nine addressed storm water quality.

To remind members of the recently implemented diazinon and chlorpyrifos TMDL in the Lower San Joaquin River, a mailing was sent out on January 5, 2011 to 1,184 Coalition members who own or operate parcels adjacent to the River and its tributaries (Table 46). The mailing included a Coalition cover letter and Regional Board letter explaining the TMDL and its impact on growers, the actions taken by the Coalition to meet the TMDL requirements, and growers' responsibilities in protecting surface waterways. The Coalition emphasized that if the loading capacity of the River is exceeded, as it was in July 2010 due to a high chlorpyrifos concentration, chlorpyrifos and diazinon use may be strictly regulated or even prohibited.

To further address chlorpyrifos use in the ESJWQC region prior to the summer months, a DOW AgroSciences Stewardship of Chlorpyrifos Mailing was sent on April 8, 2011 to 1,174 growers with the potential to directly drain to waterways (including spray drift, Table 46). The flyer included in the mailing contained information about the potential consequences of recent chlorpyrifos detections in local waterways and management practices that growers can take to avoid surface water contamination.

Chlorpyrifos is a concern for the majority of Coalition subwatersheds, but concern over chlorpyrifos amplified in the Deadman Creek subwatershed following three exceedances that occurred during the 2010 irrigation season. To remind growers of their responsibility to protect water quality (especially during the irrigation season) and potential consequences if water quality does not improve in Deadman Creek; the Coalition sent an informational mailing on May 27, 2011. Forty-nine members received the mailing, which also included a management practice flyer (Table 46).

The Coalition continues to inform members of ongoing changes and developments to existing regulations. On November 16 and 17, 2011 Coalition representatives participated at the Fresh Approaches to Fertilizing Techniques 2011 Conference, hosted by the California Department of Food and Agriculture's (CDFA) Fertilizer Research and Education Program (FREP) and the Western Plant Health Association (WPHA). Topics included upcoming changes within the ILRP to develop general orders specific to Coalition groups that will include groundwater, nutrient management plans and implementing nutrient management strategies (Table 46).

During 2011, the Coalition also sent out several mailings to inform growers of monitoring results, Coalition actions and related news. On January 14, 2011, the ESJWQC Update Newsletter was mailed to 2,323 members, and the ESJWQC member 2010 Annual Report was mailed to 2,181 members who did not attend the 2010 Annual Grower Meetings (Table 46). A second newsletter was mailed to 1,961 and emailed to 349 members on April 5, 2011. In addition, the Coalition also sends Quarterly Monitoring Exceedance Reports to growers who have requested the information. Additionally, mailings and emails were sent out to growers on February 2, 2011 (134 mailings and 90 emails); May 10, 2011 (121 mailings and 112 emails); August 24, 2011 (138 mailings and 124 emails); and on November 9, 2011 (148 mailings and 123 emails).

The Coalition continues to collaborate with outside sponsors to secure unique opportunities that will enhance the Coalition's ability to achieve its goal of reducing the impact of agricultural discharge on water quality. As described in the 2010 AMR, the ESJWQC, along with the Coalition for Urban and Rural Environmental Stewardship (CURES), the Westside San Joaquin River Watershed Coalition, Natural Resources Conservation Service (NRCS), and the West and East Stanislaus Resource Conservation District, received an award of two million dollars annually over 5 years ($10 million total) from the United States Department of Agriculture (USDA) Agricultural Water Enhancement Program (AWEP) to be used in Stanislaus and Merced counties (2010 AMR, page 150 and Table 42, page 154). The money is being used to fund the installation of structural management practices on farms and dairies with operations bordering waterways within subwatersheds covered by management plans. The Coalition sent a CURES / AWEP Funding mailing on February 10, 2011 to 512 members in the Bear Creek, Cottonwood Creek, Dry Creek @ Wellsford, Highline Canal @ 99, Duck Slough @ Hwy 99, Duck Slough @ Gurr, and Prairie Flower Drain subwatersheds (Table 46). The mailing included a letter informing growers of available CURES / AWEP funding and instructions on how to apply; the letter also specified the deadline to apply for the fourth year was March 1, 2011.

In addition to AWEP funding, the Coalition was also able to promote management practice implementation in other ways. Eight million dollars in Proposition 84 funding were made available for management practice installations for growers in the Duck Slough, Bear Creek, and Prairie Flower Drain subwatersheds. A mailing was sent to 84 members in these subwatersheds on March 8, 2011 detailing the available funds, application process, and deadline to apply (October 2012 or until all funds are contracted, whichever comes first). Another mailing on December 20, 2011 informed 116 members in the Duck Slough, Bear Creek, and Prairie Flower Drain subwatersheds that the deadline for second year applications had been extended to January 17, 2012 (Table 46).

The Annual Grower Meetings continue to serve as an opportunity to present and discuss all aspects of the Coalition activities over the past year. The Annual Grower Meeting announcement was emailed to 372 members and was mailed to 1,942 members on November 28, 2011 (Table 46). Thirty-eight members were in attendance at the December 13 meeting in Merced County, 76 members attended the December 14 meeting in Stanislaus County, and 37 members attended the December 15, 2011 meeting in Madera County. At all three meetings, Coalition representatives reviewed the past year's water quality monitoring results, the ESJWQC management plan strategy and status, and various Coalition activities including outreach, collaborations and member responsibilities. Coalition representatives also discussed the Waste Discharge Requirements General Order for Growers within the Easter San Joaquin River Watershed (pending Order) which includes groundwater program requirements, and its anticipated impact on Coalition members. Various informational handouts were made available to growers, including management practice information and the 2011 Summary Annual Report.

The Coalition hosts a website (http://www.esjcoalition.org/home.asp), which serves as a clearing house for Coalition activities and outreach on management practices. Information provided through the website functions as a useful supplement to regular grower contacts and meetings.

PEST CONTROL ADVISORS, AGRICULTURAL COMMISSIONERS, AND REGISTRANTS

Agricultural Commissioners from the various counties are active participants as non-voting members of the ESJWQC Board of Directors. The Coalition collaborates with County Agricultural Commissioners, Pest Control Advisors (PCAs), and pesticide registrants to provide growers within the ESJWQC region with information on effective management practices. Throughout 2011, the Coalition collaborated with each of these entities as needed to follow up on exceedances, including such actions as providing management practice information to growers, and to prepare strategies for compliance under the pending Order.

Table 46. ESJWQC 2011 outreach actions (grower notification, management practice tracking, and management practice outreach and education)

Area	Date	Category	Details	Constituents Addressed	Who
Entire Coalition region	5-Jan-11	Best Management Practice(BMP) Outreach and Education	Diazinon and Chlorpyrifos TMDL in the Lower San Joaquin River Grower Mailing: sent to 1,184 members who own or operate parcels adjacent to the River and its tributaries. Included a Coalition cover letter and Regional Board letter that explain the TMDL and its impact on growers, the actions taken by the Coalition to meet the TMDL requirements, and growers' responsibilities in protecting surface waterways.	Chlorpyrifos and diazinon	Parry Klassen, Wayne Zipser
Entire Coalition region	14-Jan-11	Grower Notification	Annual Report Mailing: sent to 2,181 members.	All	Parry Klassen, Wayne Zipser
Entire Coalition region	14-Jan-11	Grower Notification	January ESJWQC Newsletter Mailing: sent to 2,323 members.	All	Parry Klassen, Wayne Zipser
Highline Canal @ Hwy 99 (2nd P)	1-Feb-11	Management Practice Tracking, Grower Notification	Highline Canal @ Hwy 99 Follow-Up to Individual Contacts (Initial) Meeting Announcement Mailing: sent to 9 members who participated in an individual meeting during 2009 and 2010. Meeting rescheduled to better accommodate growers' schedules.	All	Parry Klassen, Wayne Zipser
Entire Coalition region	2-Feb-11	Grower Notification	Quarterly Monitoring Exceedance Report Mailing: mailed to 134 and emailed to 90 members.	All	Parry Klassen, Wayne Zipser
Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, Duck Slough @ Hwy 99, Dry Creek @Wellsford, Highline Canal @ Hwy 99, Prairie Flower Drain	10-Feb-11	Grower Notification	CURES AWEP Funding Mailing: sent to 512 members. Deadline to apply for fourth year is March 1, 2011.	All	Parry Klassen, Wayne Zipser
Cottonwood Creek (2nd P)	15-Feb-11	Management Practice Tracking, Grower Notification	Cottonwood Creek Follow-Up to Individual Contacts (Initial) Meeting Announcement Mailing: sent to 24 members who participated in an individual meeting during 2009 and 2010. Meeting rescheduled to better accommodate growers' schedules.	All	Parry Klassen, Wayne Zipser

Area	Date	Category	Details	Constituents Addressed	Who
Bear Creek and Duck Slough @ Gurr (2nd P)	16-Feb-11	Management Practice Tracking, Grower Notification	Bear Creek and Duck Slough @ Gurr Follow-Up to Individual Contacts (Initial) Meeting Announcement Mailing: sent to 14 and 6 members, respectively, who participated in an individual meeting during 2009 and 2010. Meeting rescheduled to better accommodate growers' schedules.	All	Parry Klassen, Wayne Zipser
Duck Slough, Bear Creek, Prairie Flower Drain	8-Mar-11	Grower Notification	Prop 84 Mailing: sent to 84 members with property adjacent to the waterway in Duck Slough, Bear Creek and/or Prairie Flower Drain subwatersheds and members outside area who requested funding information. Applications are accepted until all available funds are fully contracted or October 2012, whichever comes first.	All	Parry Klassen, Wayne Zipser
Berenda Slough (3rd P)	9-Mar-11	Management Practice Tracking, Grower Notification	Berenda Slough Individual Contacts Meeting Announcement Mailing: sent to 22 targeted growers. Alerted targeted members of the Management Plan high priority tracking process and the need to schedule an individual meeting with Parry Klassen or Wayne Zipser.	All	Parry Klassen, Wayne Zipser
Entire Coalition region	5-Apr-11	Grower Notification	April ESJWQC Newsletter Mailing: mailed to 1,961 and emailed to 349 members.	All	Parry Klassen, Wayne Zipser
Entire Coalition region	8-Apr-11	Grower Notification	DOW AgroSciences Stewardship of Chlorpyrifos Mailing: sent to 1,174 growers with the potential to directly drain to waterways (including spray drift). Flyer included information about the potential consequences of recent chlorpyrifos detections in local waterways and BMPs that growers can take to avoid surface water contamination.	Chlorpyrifos	Parry Klassen, Wayne Zipser
Cottonwood Creek (2nd P)	14-Apr-11	Management Practice Tracking, Grower Notification	Rescheduled Cottonwood Creek Follow-Up to Individual Contacts Meeting Announcement Mailing: sent to all members who participated in an individual meeting during 2009 and 2010.	All	Parry Klassen, Wayne Zipser
Bear Creek, Duck Slough @ Gurr, Highline Canal @ Hwy 99 (2nd P)	14-Apr-11	Management Practice Tracking, Grower Notification	Rescheduled Bear Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow-Up to Individual Contacts Meeting Announcement Mailing: sent to all members who participated in an individual meeting during 2009 and 2010.	All	Parry Klassen, Wayne Zipser
Cottonwood Creek (2nd P)	26-Apr-11	Management Practice Tracking, BMP Outreach and Education	Rescheduled Cottonwood Creek Follow Up to Individual Contacts Grower Meeting: 14 growers were represented in attendance. By using the Turning Interactive Survey Devices, assessed implementation of management practices since individual contact meetings in 2009 and 2010.	All	Parry Klassen, Wayne Zipser

Area	Date	Category	Details	Constituents Addressed	Who
Bear Creek, Duck Slough @ Gurr, Highline Canal @ Hwy 99 (2nd P)	28-Apr-11	Management Practice Tracking, BMP Outreach and Education	Rescheduled Bear Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts Grower Meeting: 3, 4, and 3 growers from each subwatershed were represented in attendance, respectively. By using the Turning Interactive Survey Devices, assessed implementation of management practices since individual contact meetings in 2009 and 2010.	All	Parry Klassen, Wayne Zipser
Entire Coalition region	10-May-11	Grower Notification	Quarterly Monitoring Exceedance Report Mailing: mailed to 121 and emailed to 112 members.	All	Parry Klassen, Wayne Zipser
Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 (2nd P)	11-May-11	Management Practice Tracking, BMP Outreach and Education	Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts Email: 7, 3, 1, and 4 growers from each subwatershed, respectively, completed the Online Follow Up Survey Form assessing implementation of new management practices.	All	Parry Klassen, Wayne Zipser
Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 (2nd P)	20-May-11	Management Practice Tracking, BMP Outreach and Education	Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts Mailing: 4, 5, 1, and 1 growers from each subwatershed, respectively, completed and returned the Follow Up Survey assessing implementation of new management practices.	All	Parry Klassen, Wayne Zipser
Deadman Creek	27-May-11	BMP Outreach and Education	Deadman Creek Chlorpyrifos Mailing: sent to 49 members in the subwatershed. Cover letter summarized chlorpyrifos water quality concerns in Deadman Creek and urged growers to implement relevant BMPs. Growers were reminded of their responsibility to protect water quality and potential consequences if water quality does not improve. A BMP informational flyer was also included in the mailing.	Chlorpyrifos	Parry Klassen, Wayne Zipser
Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 (2nd P)	1-Jun-11	Management Practice Tracking, Grower Notification	Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts - Final Attempt to Contact Mailing: sent to 9, 7, 2, and 4 members, respectively. Letter reminded members of their responsibility to provide the Coalition with requested management practice information and indicated if a response was not received by July 31, 2011, the member would be dropped from the Coalition.	All	Parry Klassen, Wayne Zipser
Entire Coalition region	24-Aug-11	Grower Notification	Quarterly Monitoring Exceedance Report Mailing: mailed to 138 and emailed to 124 members.	All	Parry Klassen, Wayne Zipser
Livingston Drain @ Robin Ave (3rd P)	7-Nov-11	Management Practice Tracking, Grower Notification	Livingston Drain @ Robin Ave Initial Contact Grower Survey - Final Attempt to Contact Mailing: sent to 7 growers. Letter reminded members of their responsibility to provide the Coalition with requested management practice information and indicated if a response was not received by Nov. 30, 2011, the member would be dropped from the Coalition.	All	Parry Klassen, Wayne Zipser

Area	Date	Category	Details	Constituents Addressed	Who
Entire Coalition region	9-Nov-11	Grower Notification	Quarterly Monitoring Exceedance Report Mailing: mailed to 148 and emailed to 123 members.	All	Parry Klassen, Wayne Zipser
Berenda Slough, Dry Creek @ Rd 18, Lateral 2 1/2, and Livingston Drain (3rd P)	15-Nov-11	Management Practice Tracking, Grower Notification	3rd Priority Results from Individual Contact Meeting Confirmation Mailing: sent to all members whom participated in individual contacts. The mailing summarized management practice implementations and recommendations recorded during each grower's Individual Contact Meeting. Growers reviewed their responses for accuracy and made corrections if necessary.	All	Parry Klassen, Wayne Zipser
Entire Coalition region	16-Nov and 17-Nov-11	BMP Outreach and Education	Fresh Approaches to Fertilizing Techniques 2011: conference on fertilizing techniques hosted by the California Department of Food and Agriculture's (CDFA) Fertilizer Research and Education Program (FREP) and the Western Plant Health Association (WPHA). Coalition representative Parry Klassen presented on the Coalition's pending new Order, specifically the groundwater regulation aspect as it relates to nitrates, fertilizers, and nutrient management plans.	Nutrients	Parry Klassen
Entire Coalition region	28-Nov-11	Grower Notification	Annual Grower Meeting Announcement: mailed to 1,942 and emailed to 372 members.	All	Parry Klassen, Wayne Zipser
Merced County	13-Dec-11	BMP Outreach and Education	Annual Grower Meeting (Merced): 38 members attended. Discussed Coalition actions toward and progress in solving water quality problems over the past year. Also discussed impending new Order, including groundwater regulations, and impact on Coalition members.	All	Parry Klassen, Wayne Zipser
Stanislaus County	14-Dec-11	BMP Outreach and Education	Annual Grower Meeting (Stanislaus): 76 Coalition members attended. Discussed Coalition actions toward and progress in solving water quality problems over the past year. Also discussed impending new Order, including groundwater regulations, and impact on Coalition members.	All	Parry Klassen, Wayne Zipser
Madera County	15-Dec-11	BMP Outreach and Education	Annual Grower Meeting (Madera): 37 Coalition members attended. Discussed Coalition actions toward and progress in solving water quality problems over the past year. Also discussed impending new Order, including groundwater regulations, and impact on Coalition members.	All	Parry Klassen, Wayne Zipser
Bear Creek, Duck Slough, and Prairie Flower	20-Dec-11	Grower Notification	Prop 84 Funding Mailing: sent to 116 members with property adjacent to the waterway in Duck Slough, Bear Creek and/or Prairie Flower Drain subwatersheds and members outside area who requested funding information. Deadline to apply for second year is extended to January 17, 2012.	All	Parry Klassen

The ESJWQC established monitoring and management activities as required in the Regional Board's Basin Plan for the Sacramento and San Joaquin River basins as well as the ILRP MRP for Coalition Groups (Order No. R5-2008-0005). The Basin Plan sets forth TMDL requirements for dischargers and requires that dischargers comply with the monitoring and management criteria defined in the Basin Plan. If a single exceedance occurs for a TMDL constituent that is under an EPA approved TMDL (currently chlorpyrifos, diazinon, dissolved oxygen, and salt/boron), a management plan will be required for that constituent and site subwatershed. In addition, if there is no TMDL for a constituent, the ILRP MRP requires that a management plan be developed if more than one exceedance of the same parameter at the same location occurs within a three-year period.

A management plan resulting from a single exceedance of a TMDL constituent, or from more than one exceedance of a constituent without a TMDL, triggers additional focused efforts within subwatersheds. Coalition efforts include but are not limited to: (1) continued monitoring based on the Coalition's approved MRPP, (2) analysis of PUR data, (3) MPM, (4) conducting site subwatershed grower meetings, (5) encouraging and evaluating implementation of management practices, and (6) compliance with approved TMDLs. The Coalition addresses exceedances associated with toxicity, pesticides, and sediment bound analytes with a recommendation to adopt specific management practices whether or not a TMDL is in place. A narrative concerning each special monitoring constituent was provided in the Coalition's Management Plan approved on November 25, 2008 (pages 24-37 of the Management Plan) as well as an explanation of how the Coalition prioritizes exceedances (pages 39-44 of the Management Plan) and is meeting the TMDL requirements for Coalition members. The MPUR to be submitted on April 1, 2012 will document all MPM activities that occurred during 2011.

In October 2005, the Regional Board finalized the Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River (hereafter Basin Plan Amendment) establishing a TMDL for the organophosphate pesticides (OP) chlorpyrifos and diazinon in the lower reaches of the San Joaquin River outside of the Delta. The Lower San Joaquin River is divided into seven subareas, which include agricultural drainages monitored by ESJWQC and Westside San Joaquin River Watershed Coalition (Westside Coalition) under the ILRP. As dictated by the Basin Plan Amendment, a surveillance and monitoring program was developed in 2010 to collect information necessary to assess compliance with the seven monitoring objectives. The ESJWQC and the Westside Coalition collaborated to develop a monitoring plan for assessing compliance of the Lower San Joaquin River concentration based loads at the six compliance points identified in the Basin Plan Amendment (Monitoring Objective 1). Sampling occurs on a monthly basis at three of the six compliance points (Sack Dam, Lander Ave, and Las Palmas Ave) and on a quarterly basis at the other three compliance points (Hills Ferry Rd, Maze Blvd, and Airport Way). The Coalitions independently assess compliance with Monitoring Objectives 2 -7 by reviewing the results of the San Joaquin River monitoring relative to the monitoring conducted in the upstream tributaries within each of the Coalition regions. The results of monitoring from the 2011 water year (October 2010 through September 2011) as well as an assessment of each Coalition's

compliance with Monitoring Objectives 2- 7 will be reported in the San Joaquin River Chlorpyrifos and Diazinon TMDL 2012 AMR (to be submitted May 1, 2012).

The Coalition's Management Plan describes the Coalition's strategy for evaluating new management practices implemented to reduce the effects of agricultural practices on water quality. As described in the Actions Taken to Address Water Quality Exceedances section, intensive outreach and documentation of management practices occur throughout the Coalition, but greater efforts to acquire these details are made within site subwatersheds designated as High Priority (see November 17, 2010 Approval Letter of Management Plan Schedule Prioritization Modification Request. An updated proposed schedule for addressing each site subwatershed will be provided in the MPUR to be submitted on April 1, 2012).

The 2012 MPUR will include the following items:

1. Status of high priority subwatershed performance goals,
2. Evaluation of current management plan strategy,
3. Evaluation of management practices and water quality improvements and
4. Status of TMDL constituents and Basin Plan requirements.

The following conclusions and recommendations answer the five key programmatic questions (ILRP MRP Order No. R5-2008-0005) using water quality information obtained under the Coalition's MRPP for January through December 2011.

QUESTION No.1: Are conditions in waters of the State that receive discharges of wastes from irrigated lands within Coalition Group boundaries, as a result of activities within those boundaries, protective of beneficial uses?

The results of the monitoring program from January through December 2011 indicate that although there has been substantial improvement in water quality in many areas, water quality is still not protective of beneficial uses across most of the Coalition region (Table 47). There has been consistent improvement in reducing the discharge of pesticides although there were exceedances of several pesticides throughout the year. The percentage of beneficial uses (BU) protected within monitored subwatersheds has increased from 21% to 60% (Table 47). The most common exceedances of WQTLs involve physical parameters such as DO, SC and TDS which resulted in impaired Agricultural and Aquatic Life (AG and AQ Life) beneficial uses. *E. coli* had numerous exceedances which resulted in impaired Recreational (REC 1) beneficial use. Impairment to Municipal (MUN) beneficial use resulted from elevated concentrations of nitrate/nitrite and ammonia. While discharges from irrigated lands are possible sources of impairments to beneficial uses in many instances, natural conditions or other sources are potentially the cause of impairment in waterways monitored by the Coalition. Water quality protective of beneficial uses within Coalition Group boundaries may not depend exclusively on the Coalition efforts alone, i.e., other dischargers may need to improve the quality of their discharge.

Table 47. Monitoring sites BUs associated with downstream waterbodies, and if sites met WQTLs for assigned beneficial uses (sorted alphabetically by monitoring site)

X indicates no sampling occurred during the years specified.

Monitoring Site	Immediate Downstream Waterbody	Beneficial Use Immediate Downstream Waterbody	Status 2004-2007 Meets BUs?	Status 2008 Meets BUs?	Status 2009 Meets BUs?	Status 2010 Meets BUs?	Status 2011 Meets BUs?
Ash Slough @ Ave 21	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	Yes	Yes	Yes	X
		AG	Yes	Yes	Yes	Yes	X
		REC 1	No	Yes	Yes	Yes	X
		AQ Life	No	Yes	No	No	X
Bear Creek @ Kibby Rd	San Joaquin River (Bear Creek to SJ River)	MUN	No	No	X	Yes	Yes
		AG	Yes	Yes	X	Yes	Yes
		REC 1	No	No	X	Yes	Yes
		AQ Life	No	No	X	Yes	Yes
Berenda Slough along Ave 18 1/2	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	X	X	X	Yes
		AG	Yes	X	X	X	Yes
		REC 1	No	X	X	X	No
		AQ Life	No	X	X	X	No
Cottonwood Creek @ Rd 20	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	Yes	Yes	Yes	Yes
		AG	Yes	Yes	Yes	Yes	Yes
		REC 1	No	Yes	No	No	No
		AQ Life	No	No	Yes	No	No
Deadman Creek @ Gurr Rd	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	No	No	No	X
		AG	Yes	Yes	No	No	X
		REC 1	No	No	No	No	X
		AQ Life	No	No	No	No	X
Deadman Creek @ Hwy 59	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	No	X	X	Yes
		AG	Yes	Yes	X	X	Yes
		REC 1	No	No	X	X	No
		AQ Life	No	No	X	X	No
Dry Creek @ Rd 18	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	No	X	X	Yes
		AG	Yes	Yes	X	X	Yes
		REC 1	No	No	X	X	Yes
		AQ Life	No	No	X	X	No
Dry Creek @ Wellsford Rd	Tuolumne River (New Don Pedro Dam to SJ River)	MUN	No	No	No	Yes	Yes
		AG	No	Yes	Yes	Yes	No
		REC 1	No	No	No	No	No
		AQ Life	No	No	No	No	No
Duck Slough @ Gurr Rd	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	Yes	No	Yes	Yes
		AG	No	Yes	No	Yes	Yes
		REC 1	No	Yes	No	No	No
		AQ Life	No	No*	No	No*	No
Duck Slough @ Hwy 99	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	No	Yes	Yes	Yes
		AG	Yes	No	Yes	Yes	Yes
		REC 1	No	No	Yes	Yes	Yes
		AQ Life	No	No	No	Yes	Yes
Highline Canal @ Hwy 99	San Joaquin River (mouth of Merced River to Vernalis) / Merced River (McSwain Reservoir to SJR)	MUN	No	No	No	Yes	No
		AG	Yes	No	No	Yes	Yes
		REC 1	No	No	No	No	No
		AQ Life	No	No	No	Yes	Yes

Monitoring Site	Immediate Downstream Waterbody	Beneficial Use Immediate Downstream Waterbody	Status 2004-2007 Meets BUs?	Status 2008 Meets BUs?	Status 2009 Meets BUs?	Status 2010 Meets BUs?	Status 2011 Meets BUs?
Highline Canal @ Lombardy Rd	San Joaquin River (mouth of Merced River to Vernalis) / Merced River (McSwain Reservoir to SJR)	MUN	No	No	X	No	Yes
		AG	Yes	No	X	Yes	Yes
		REC 1	No	No	X	Yes	No
		AQ Life	No	No	X	No	No
Howard Lateral @ Hwy 140	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	No	Yes	Yes
		AG	X	X	No	Yes	Yes
		REC 1	X	X	No	No	Yes
		AQ Life	X	X	No	No	No
Lateral 2 ½ near Keyes Rd	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	X	No	Yes	Yes
		AG	X	X	No	Yes	Yes
		REC 1	X	X	No	Yes	Yes
		AQ Life	X	X	No	No	Yes
Livingston Drain @ Robin Ave	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	No	X	X	Yes
		AG	Yes	Yes	X	X	Yes
		REC 1	Yes	No	X	X	Yes
		AQ Life	No	No	X	X	No
McCoy Lateral @ Hwy 140	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	X	Yes
		AG	X	X	X	X	Yes
		REC 1	X	X	X	X	Yes
		AQ Life	X	X	X	X	No
Merced River @ Santa Fe Rd	Merced River (McSwain Reservoir to SJ River)	MUN	No	Yes	Yes	Yes	No
		AG	Yes	Yes	Yes	Yes	Yes
		REC 1	No	Yes	Yes	No	No
		AQ Life	No	No	No	Yes	Yes
Mootz Drain downstream of Langworth Pond	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	X	Yes	No	X
		AG	X	X	Yes	Yes	X
		REC 1	X	X	No	No	X
		AQ Life	X	X	No	No	X
Mustang Creek @ East Ave	San Joaquin River (mouth of Merced River to Vernalis) / Merced River (McSwain Reservoir to SJR)	MUN	No	No	No	Yes	X
		AG	No	No	No	No	X
		REC 1	No	No	No	No	X
		AQ Life	Yes	No	No	No	X
Prairie Flower Drain @ Crows Landing Rd	San Joaquin River (mouth of Merced River to Vernalis)	MUN	No	No	No	No	No
		AG	No	No	No	No	No
		REC 1	No	No	No	No	No
		AQ Life	No	No	No	No	No
Rodden Creek @ Rodden Rd	Tuolumne River (New Don Pedro Dam to SJ River)	MUN	X	X	X	X	No
		AG	X	X	X	X	Yes
		REC 1	X	X	X	X	No
		AQ Life	X	X	X	X	Yes
Count of BU Protected (Yes)			**14**	**19**	**15**	**32**	**41**
Count of BU Not Protected (No)			**50**	**40**	**37**	**27**	**27**
% of Protected BU in Monitored Subwatersheds			**22%**	**32%**	**29%**	**54%**	**60%**

BU- Beneficial Use
AG- Agriculture
AQ Life- Aquatic Life
MUN- Municipal and Domestic Supply
REC 1- Water Contact Recreation
X-Site was not scheduled for sampling during the year
*Does not meet BUs requirements due to sediment toxicity to *H. azteca* in one or more occurrences.

QUESTION No.2: What is the magnitude and extent of water quality problems in waters of the State that receive agricultural drainage or are affected by other irrigated agriculture activities within Coalition Group boundaries, as determined using monitoring information?

Appendix II includes all tabulated results from January through December 2011. Exceedances occurred in every zone during 2011 monitoring (Table 48).

In 2011, there were no exceedances of WQTLs for Group A pesticides which were monitored January through June 2011. Less than 1% of samples collected in 2011 exceeded WQTLs for carbamates, herbicides, organochlorines and organophosphates (Table 48). Only 2% of samples were toxic to water column test species and 2% exceeded the WQTLs for metals. Exceedances of physical parameters and *E. coli* were more common than exceedances of pesticides or metals (7%, 30%, <1%, and 2%, respectively). Some exceedances were more common during specific seasons. During summer months, warm water with little or no flow coincided with exceedances of the WQTL for DO.

As described in the Discussion of Results section, the zones differed substantially in the types of exceedances. For example, in Zone 2 (Prairie Flower Drain @ Crows Landing Rd) there were a large number of exceedances of SC, TDS, and nitrate (Table 48). Zone 2 is located in the western portion of the Coalition region with shallow salty groundwater and a high density of dairy operations. The discharges are most probably a result of intrusion of shallow ground water into Prairie Flower Drain (see response to Question #3 below). Zones 1 and 5 had frequent *E. coli* exceedances (9 of 24 samples and 7 of 23 samples, respectively) and are locations within the Coalition region with large numbers of rural dwellings near surface waters.

Exceedances of some parameters were more common in certain zones. For example, elevated levels of dissolved copper were common in sites monitored in Zone 6 (Berenda Slough along Ave 18 ½, Cottonwood Creek @ Rd 20 and Dry Creek @ Rd 18,Table 48). This suggests that geologic conditions and/or soils with high copper content could be contributing to the exceedances.

Overall, Zones 2 and 6 had the greatest percentage of exceedances (9% and 3%, respectively) while Zones 3 and 4 had the lowest percentage (<1% each, Table 48). In comparison to the 2010 monitoring year, all analyte groups had lower percentages of exceedances except for carbamates, metals, nutrients and organochlorines. In 2010, there were no carbamate exceedances versus one exceedance in 2011 (<1% of samples). A total of nine exceedances of metals occurred in 2010 (1.6% of samples) compared to 36 in 2011 (2% of samples). The total percentage of nutrient exceedances increased between 2010 (3.5% of samples) and 2011 (6% of samples); however, the total exceedances of nutrients was 15 in both 2010 and 2011. In 2010, there were no organochlorine exceedances (monitored from July through December 2010); in 2011 there were four (monitored from January through June 2011, <1% of samples). Overall, samples with exceedances decreased from 4.3% to 2% between 2010 and 2011.

There were three chlorpyrifos exceedances during 2011 (<1%% of samples).

None of the three chlorpyrifos exceedances occurred at MPM locations. The three exceedances that did occur were from irrigation monitoring events (two in April and one in September) and occurred in samples collected from two subwatersheds within the Coalition area. One of the two subwatersheds (Berenda Slough @ Ave 18 ½) was undergoing Assessment Monitoring during the month in which the exceedance occurred. Berenda Slough is a third priority subwatershed and is receiving focused outreach and education. The other subwatershed (Deadman Creek @ Hwy 59) had two chlorpyrifos exceedances in 2011 is a fourth high priority subwatershed scheduled for focused outreach and education in 2012.

There were two (<1% of samples) exceedances of dimethoate during 2011 monitoring (August and September). The Coalition has identified the grower who applied the dimethoate and will discuss management practices involved in reducing the movement of contaminants to the waterway. The Coalition represents growers that do not operate dairy facilities and is responsible for outreach to those growers. A majority of dairy operators in the Dairy Program are not members in the Coalition and do not participate in Coalition programs to reduce the movement of chlorpyrifos to surface waters. It is doubtful that chlorpyrifos exceedances can be prevented until all farmers and dairy operators are engaged in active product management. The Coalition anticipates that it will take two to five years of increased efforts in priority subwatersheds to eliminate all pesticide exceedances.

There was a single diuron exceedance in 2011 that occurred in February 2011 (storm event). Diuron is a soluble pre-emergent herbicide that is used by a large number of groups including but not limited to agriculture, cities, counties, Caltrans, and the railroads. Diuron is applied by numerous groups during the winter weed growing season and consequently, this is another chemical for which it is difficult to assign responsibility for exceedances. However, diuron applications by irrigated agriculture indicate that exceedances may be the responsibility of irrigated agriculture and the Coalition will continue to provide outreach to its members about the management of the product.

A single exceedance of the carbaryl WQTL occurred in 2011 during August monitoring. The source of the carbaryl exceedance has been identified and the Coalition is in the process of making Prop 84 funds available to the member so that he can implement a sediment retention pond.

Finally, the agricultural landscape is very dynamic with respect to the ownership and operation of different parcels in the Coalition region. As the farming community ages, many operations are sold or divided among family resulting in new growers each year across the entire Coalition region. In many instances, these growers are already members and are adding to their holdings. In these cases, these growers often begin farming and implement the management practices necessary to protect surface waters. In other instances however, new growers begin farming and they have little or no understanding of the water quality issues in their subwatershed or Coalition efforts to improve water quality. Therefore, exceedances may result and when these occur, the Coalition will identify the potential sources and contact the growers as necessary. Consequently, the water quality in various subwatersheds may improve for a few years but exceedances may occur in the future. The Coalition recognizes that performing the monitoring and outreach to maintain good water quality is a long term endeavor and will remain engaged in the process as long as necessary.

Table 48. ESJWQC 2011 exceedances by constituent group and zone

Analyte Name	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		Zone 6		Total Exceed.	Total Samples	Pct. Exceed.
	Exceed. Count	Samples	Exceed. Count	Samples	Exceed. Count	Samples	Exceed. Count	Samples	Exceed. Count	Samples	Exceed. Count	Samples			
Carbamates	0	144	1	72	0	120	0	126	0	139	0	132	1	733	<1%
E. coli	9	24	9	12	3	20	1	21	7	23	8	22	37	122	30%
Group A Pesticides	0	154	0	77	0	132	0	132	0	154	0	154	0	803	0%
Herbicides	1	168	0	84	0	142	0	148	0	162	0	158	1	862	<1%
Metals	0	288	5	144	1	244	6	273	1	302	23	294	36	1545	2%
Nutrients	0	48	15	24	0	40	0	42	0	46	0	44	15	244	6%
Organochlorines	1	84	1	42	1	72	1	72	0	84	0	84	4	438	<1%
Organophosphates	0	288	2	146	0	240	0	258	2	279	2	268	6	1479	<1%
Physical parameters	6	108	28	60	1	98	2	150	6	119	5	121	48	656	7%
Sediment toxicity	1	4	0	2	0	4	0	4	1	4	0	6	2	24	8%
Water column toxicity	0	72	5	36	1	60	0	67	1	71	0	69	7	375	2%
Count per Zone	**18**	**1382**	**66**	**699**	**7**	**1172**	**10**	**1293**	**18**	**1383**	**38**	**1352**	**Grand Total**		
Pct Exceed. per Zone	**1%**		**9%**		**<1%**		**<1%**		**1%**		**3%**		**157**	**7281**	**2%**

QUESTION No.3: What are the contributing source(s) from irrigated agriculture to the water quality problems in waters of the State that receive agricultural drainage or are affected by other irrigated agriculture activities within Coalition Group boundaries?

For many parameters, it is not clear to what extent WQTL exceedances are from agricultural activities that result in off-site movement of farm inputs and sediment into waterways. Source identification is difficult especially for non-conserved constituents and constituents with numerous potential sources. There are non-conserved constituents that cannot be traced upstream, e.g. DO. For example, locations at the west side of the Coalition region (Zone 2) had numerous exceedances of SC and TDS. The construction of drains such as Prairie Flower Drain occurred in the late 1800s as a means of lowering the shallow ground water table to a level that allowed crops to be grown. The shallow ground water is very salty and although indirectly a result of agriculture, the water in Prairie Flower Drain for a large portion of the year is not discharged by agriculture. It cannot be recirculated and must be discharged leading to the potential for exceedances of specific conductivity and pesticide WQTLs. Retention basins would fill from shallow groundwater almost as soon as construction was completed. Consequently, locations along the western margin of the Coalition region may have exceedances that result from normal farming practices and those practices will have to be adjusted to reduce the potential for discharges which impair beneficial uses.

Exceedances of the nutrient WQTLs are a major cause of impairment of the Municipal beneficial use and may or may not be a result of fertilizer runoff into waterways. Elevated concentrations of nitrate tend to occur in subwatersheds such as Prairie Flower Drain where surface drains intercept shallow groundwater that has a high concentration of nitrate from decades of discharge from dairy operations. Unless sophisticated isotopic analytical analyses are performed, it is not possible to distinguish nitrate originating from inorganic fertilizers applied to crop land from nitrate originating from cows in dairy and feedlot operations.

Agricultural applications of pesticides may result in pesticides entering surface waters as a result of spray drift or runoff in either storm water or irrigation return flows. Pesticides with exceedances of their WQTL were carbaryl, chlorpyrifos, diuron and dimethoate. Legacy pesticides no longer legal to use also continue to be found in Coalition water and sediment and the sources of those exceedances may never be identified. Current thinking that these legacy pesticides reside in the soil column in agricultural fields is difficult to reconcile with the pattern of exceedances. Legacy pesticide exceedances of DDT occurred in 2011 and if the soil maintains a reservoir of legacy organochlorine pesticides, there should be more regular exceedances as storm water and irrigation tailwater moves those pesticide residues to surface waters. The Coalition is continuing to identify sources of WQTL exceedances of currently registered pesticides through PUR analysis, assessment of water quality data and evaluation of current management practices. The Coalition's sourcing strategy is further described in the Coalition's Management Plan.

Exceedances of the copper WQTL in 2011 occurred 31 times in seven subwatersheds. The Coalition monitors for both dissolved and total copper and only dissolved copper concentrations have exceeded WQTLs. There are a number of sources that could be responsible for dissolved copper including recent

agricultural applications (either through storm/irrigation runoff or spray drift), dairy uses of copper sulfate in footbaths, resuspension of historic copper from upstream mining, brake pads and other anthropogenic uses. Copper is applied by agriculture in a variety of forms mostly as a fungicide. Despite the numerous potential sources of copper, the Coalition continues to identify agricultural sources of copper through PUR data and evaluate current management practices as described in the Coalition's Management Plan.

QUESTION No.4: What are the management practices that are being implemented to reduce the impacts of irrigated agriculture on waters of the State within the Coalition Group boundaries and where are they being applied?

The Coalition has identified eight general classifications of management practices that are effective at reducing the impacts of agricultural discharges on water quality including:

1. Reduction in application rates,
2. Spray drift management,
3. Change to low risk products,
4. Polyacrylamide (PAM),
5. Drip or microspray irrigation,
6. Recirculation/tailwater return system,
7. Retention pond/holding basin, and
8. Grass waterways or grass filter strips.

The MPUR submitted every April 1 includes details on the number of growers implementing practices and acres associated with these specific management practices. The Coalition has conducted meetings with targeted growers to document current management practices in the first, second, and third priority subwatersheds. Follow up contacts with those targeted growers to document newly implemented management practices that occurred in the first and second priority subwatersheds. Newly implemented practices include those recommended by the Coalition as well as additional practices growers implement without a specific recommendation to do so. The Coalition only reports on newly implemented management practices that are designed to address local water quality impairments. The 2011 MPUR summaries all currently implemented management practices in the first priority subwatersheds, and the 2012 MPUR will summarize currently implemented management practices in the second and third priority subwatersheds and newly implemented management practices in the first and second priority subwatersheds. The Coalition has initiated follow up contacts in the third priority subwatersheds and is beginning to schedule individual meetings with targeted growers in the forth priority subwatersheds; the Coalition will report on its findings in the 2013 MPUR.

Per each of the first and second priority subwatersheds, the Coalition has summarized the acres associated with newly implemented management practices designed to reduce the impacts of irrigated agriculture on the waters of the State within the ESJWQC (Table 49). When evaluating management practices and the associated acreage, a parcel may be included under multiple management practices. Therefore, the acreages in Table 49 cannot be summed together across management practices for each

subwatershed, but can be used to evaluate number of acres with a particular practice within the overall targeted direct drainage acreage of the subwatershed. An additional category of management practices is listed called "Other (not specified)" and includes management practices implemented by growers in the subwatershed that were not recommended during individual visits (Table 49).

A majority of the practices listed in Table 49 affect the amount of irrigation and/or storm water runoff and include: installing microirrigation systems, reducing the amount of water used in surface irrigation, installing a device to control the amount and/or timing of discharge into a waterway, implementing sediment ponds and/or implementing a recirculation/tailwater return system (Table 49). Drainage basins and recirculation/tailwater return systems also have a double purpose of reducing sediment discharge in addition to reducing or eliminating agricultural waste discharge into a downstream waterbody. Grass row centers and filter strips are already commonly implemented practices and do not represent a high percentage of the targeted acreage in Table 49 (<1% and 1%, respectively); most growers are already implementing these practices when applicable. Both grass rows and filter strips can be effective in reducing the amount of pesticides and fine particulate matter in agricultural discharges to surface waters. Of the seven high priority subwatersheds listed in Table 49, only one subwatershed has acreage where polyacrylaminde (PAM) will be applied (150 acres in Prairie Flower Drain subwatershed). PAM is used to help fine particles settle out (as well as any pesticide or metal bound to those fine particles) prior to surface water discharge. PAM is effective in certain situations where water can be held for a certain amount of time prior to discharge. The remaining practices documented as newly implemented are specific to drift management and include: shutting off outside nozzles when spraying outer rows next to sensitive sites, spraying areas close to waterbodies when the wind is blow away from them, using air blast applications when the wind is 3-10 mph and upwind of sensitive sites, using electronic spray nozzles and using nozzles that provide the largest effect droplet size to minimize drift (Table 49).

Table 49. First and second priority subwatershed targeted acreage with newly implemented management practices.

Management Practices	1st Priority Subwatersheds			2nd Priority Subwatersheds				Sum of Acreage with Management Practice[2]	Percent of Targeted Acres
	Dry Creek @ Wellsford Rd (Targeted acres: 6,392)	Duck Slough @ Hwy 99 (Targeted acres: 4,016)	Prairie Flower Drain @ Crows Landing Rd (Targeted acres: 865)	Bear Creek @ Kibby Rd (Targeted acres: 1,292)	Cottonwood Creek @ Rd 20 (Targeted acres: 5,768)	Duck Slough @ Gurr Rd (Targeted acres: 2,656)	Highline Canal @ Hwy 99 (Targeted acres: 368)		
Drainage Basins (Sediment Ponds)	121		150					271	1%
Filter strips at least 10' wide around field perimeter	28				8			36	<1%
Grass row centers	107							107	1%
Install device to control amount/timing of discharge to waterway		1,148	512					1,660	8%
Microirrigation system		279		207				486	2%
Recirculation - Tailwater return system	443							443	2%
Reduce amount of water used in surface irrigation	162	764	271	404	427		197	2,225	10%
Shut off outside nozzles when spraying outer rows next to sensitive sites	524	646				622		1,792	8%
Spray areas close to waterbodies when the wind is blowing away from them					1,107	91	25	1,223	6%
Use air blast applications when wind is 3-10 mph and upwind of sensitive sites							25	25	<1%
Use electronic controlled sprayer nozzles					375			375	2%
Use nozzles that provide largest effective droplet size to minimize drift							121	121	1%
Use Polyacrylamide (PAM)			150					150	1%
Other (Not specified)[1]	3,651	451						4,102	19%

[1]If growers implemented management practices other than those asked about during Coalition follow-up, they were instructed to indicate so and provide a summary/explanation.
[2]Refers to newly implemented practices that have occurred after individual visits with Coalition representatives.

QUESTION No.5: Are water quality conditions in waters of the State within Coalition Group boundaries getting better or worse through implementation of management practices?

Monitoring data indicate that the number of exceedances of pesticides and metals decreased in 2011 relative to previous years, most notably in the first through third high priority site subwatersheds. These results indicate an improvement in water quality that result from decreases in pesticide discharges. Exceedances of the chlorpyrifos WQTL substantially decreased from nine in 2010 (1.6%) to three in 2011 (<1%). The Coalition believes that this decline is a direct result of the visits with individual growers in the high priority subwatersheds. The first set of high priority subwatersheds were selected due to the high frequency and magnitude of pesticide exceedances from 2004 to 2008; in particular chlorpyrifos. For example, the Dry Creek @ Wellsford subwatershed was one of the first high priority subwatersheds to receive individual grower visits. There was one exceedance of the chlorpyrifos WQTL in August 2009 and one in July 2010. The Coalition identified the source as a new member who had not participated in the grower visits in 2008-09. The Coalition met with a new member of the Dry Creek @ Wellsford subwatershed in 2010 to discuss management practices. There were no exceedances of the chlorpyrifos WQTL in any of the first through third priority site subwatersheds during 2011 MPM.

There are improvements that can occur still. Not all subwatersheds with chlorpyrifos exceedances have been the focus of individual grower visits. And, even in those subwatersheds that have received grower visits, exceedances still occur. For example, one exceedance of chlorpyrifos did occur during NM at Berenda Slough along Ave 18 ½, a high priority subwatershed. The Coalition has completed focused outreach in the Berenda Slough subwatershed and anticipates the implementation of new management practices will improve the water quality results in that subwatershed in 2012. The two remaining chlorpyrifos exceedances were from Deadman Creek @ Hwy 59 which is a fourth high priority subwatershed and will have focused outreach and education in 2012.

It also appears that some growers have changed products without changing management practices. Exceedances of different pesticide's WQTL occurred in 2011 suggesting that some growers believed that it was the product, not the management practices that needed to change. Those growers either have been contacted or will be contacted to emphasize that regardless of the product applied, appropriate management practices must be used to protect water quality. However, the overall monitoring results from the summer of 2011 indicate that visits from Coalition representatives and the presumed implementation of management practices are resulting in improved water quality.

In years past, a reduction in exceedances of metals occurred when the Coalition began testing for dissolved metals as well as total (dissolved plus particulate) metals. When testing for total metals, a calculation was performed to predict dissolved metals based on total metals results. The lack of exceedances when analyzing for dissolved metals indicates the conversion may not be accurate or appropriate for the Coalition region and it is not known if the improvement in water quality is a result of the inaccurate conversion or a reduction in the concentration of metals in surface waters. Metals exceedances did not decrease between 2010 (nine, 1.6% of the samples) and 2011 (36, 2% of the samples). The metals causing the greatest number of exceedances were copper (31) and molybdenum (5). All five exceedances of the molybdenum WQTL were from a single site (Prairie Flower Drain @

Crows Landing Rd) suggesting that molybdenum was a result of site-specific factors. The 31 copper exceedances occurred at seven sites suggesting copper exceedances were a result of similar conditions across the Coalition region.

The source of the copper is not known but the relatively restricted geographic areas of exceedances, the broader distribution of applications to the same commodities argues for a natural source rather than an anthropogenic cause. However, Coalition representatives are discussing management practices with growers that should result in reductions of dissolved copper if copper exceedances are the result of applications of copper-based pesticides. The presence of molybdenum in the San Joaquin Valley has been documented by Regional Board for over two decades (Westcot et al. 1990). However, a study of agricultural discharge in Stanislaus, Merced, and Madera counties indicated no molybdenum in drainage water (Westcot and Belden, 1989). In the latter study, the reporting limit/detection limit appears to be 5 µg/L, which is a relatively high value compared to current analyses. Taken together, these studies suggest that molybdenum is locally abundant in soils and surface and groundwater, and that agriculture is not responsible for the elevated concentrations found in Prairie Flower Drain.

In 2011, fewer pesticide exceedances of chlorpyrifos occurred compared to past years. There were only three exceedances of the chlorpyrifos WQTL in 2011 compared to nine in 2010. Other exceedances of currently registered pesticides did occur for carbaryl, dimethoate and diuron.

Water column toxicity occurred in seven of 375 samples (2%) in 2011. In 2011, one sample was toxic to *C. dubia,* two to *Pimephales*, and four to *S. capricornutum*. Both *Pimephales* samples considered toxic due to statistical differences in survival between the sample and the control, and had 80% or greater survival. The *Pimephales* toxicity in the sample collected from Prairie Flower Drain (80% survival) was attributed to discharges from dairies as it was accompanied by extremely elevated concentrations of ammonia. The four samples toxic to *Selenastrum* in 2011 (1% of 375 samples collected for water column toxicity) were an increase over the one toxic sample in 2010 (<1% of 166 samples collected for water column toxicity). Overall, the number of samples collected for water column toxicity in 2011 was greater than the number of samples collected for water column toxicity in 2010 (375 samples compared to 166 samples). More samples were collected in 2011 for toxicity than in 2010. One of the four samples had growth that was 82% of the growth in the control and is not considered an ecologically relevant depression of growth. The other three samples with algae toxicity ranged from 8% to 35% growth compared to the control. The 2011 winter was much wetter in comparison to 2010 which could possibly be the result in increased applications of herbicides like diuron. The PUR data indicate that in 2010 there were 357 applications of diuron compared to 550 applications in 2011.

The other area with notable improvement was sediment toxicity. Sediment toxicity in samples occurred only once in 2010 (out of 13 samples collected for irrigation sediment monitoring only), and two times in 2011 (out of 24 samples collected for storm and irrigation sediment monitoring) indicating a significant improvement over previous years. In 2008, sediment toxicity occurred in 24 samples.

The conclusions from these data are that 1) individual grower visits continue to be an effective method of communicating with members, 2) implementation of management practices is improving water quality in the Coalition region, and 3) there is opportunity for improvement in several subwatersheds in which exceedances of WQTLs still occur.

Based on the responses above, the Coalition has the following recommendations for 2012:

1. Continue the current monitoring strategy as outlined in the ESJWQC MRPP and Management Plan to evaluate water quality improvements and impairments.
2. Continue to document and assess management practices implemented by Coalition growers.
3. Continue to focus outreach and education efforts around high priority constituents while also educating growers about lower prioritized constituents such as dissolved oxygen and salinity.

The Coalition recommends that the Central Valley Regional Water Quality Control Board (CVRWQCB) do the following:

1. Identify dairies within priority subwatersheds that are using chlorpyrifos and/or copper which may be affecting downstream beneficial uses.
2. Notify the Coalition of any known dairy discharges that may result in water quality impairments.
3. Continue enforcement actions against non-members who have the potential to discharge.

REFERENCES

Westcot, D. W. and K. K. Belden. 1989. *Quality of agricultural drainage discharges to the San Joaquin River from area east of the river in Stanislaus, Merced, and Madera Counties, California January 1986 to September 1988.* California Regional Water Quality Control Board, Central valley Region Report, April 1989.

Westcot D. W., B. J. Grewell, and J. E. Chilcott. 1990. *Trace element concentrations in selected streams in California: A synoptic survey.* California Regional Water Quality Control Board, Central valley Region Report, October 1990.